ENERGY EFFICIENCY AND LEAST-COST PLANNING: THE BEST WAY TO SAVE MONEY AND REDUCE ENERGY USE IN HAWAII

Robert J. Mowris, Professional Engineer
California License #26191
Energy Consultant
205 Fairlawn Drive
Berkeley, California 94708

Prepared for the
RAINFOREST ACTION NETWORK
301 Broadway, Suite A
San Francisco, CA 94133
(415) 398-4404

January 11, 1990

Abstract

If the geothermal resource on the Big Island of Hawaii is developed as planned, the Wao Kele 'O Puna rainforest will be destroyed, seriously damaging U.S. credibility in its efforts to halt rainforest destruction worldwide. It would be tragic for this to happen, since on a least-cost basis, the geothermal project does not make economic sense. Improving energy efficiency in Hawaii over the next ten years can reduce electricity demand by almost 50% at an average cost of less than 4 ¢/kWh. This is almost 5 times less than the estimated 30-year levelized cost of providing power from the proposed geothermal project and accompanying undersea cable. The "bottom line" is that the geothermal project is risky, very expensive to build and maintain, and comes with no guarantees. On the other hand, a state-wide energy efficiency program using proven technology, will free up more power than the geothermal project could ever provide, will save Hawaiian ratepayers hundreds of millions of dollars, and will buy precious time to develop solar and wind power over the next 10-20 years.

The choice is simple, but political and legislative action is required. Hawaii must move forward and develop a least-cost electricity planning process to ensure that all available options for meeting new electricity demand are assessed before investing in new supply. Utility profit-making rules have to be rewritten to reward utilities for investing in the energy efficiency of their customers, and building energy standards must be implemented and enforced. If new sources of electricity supply are required, then state energy planners must make every effort to develop solar and wind power, and improve the efficiency of electricity generation from sugar cane bagasse, since all of these technologies are currently cheaper than geothermal power. All available resource options must be seriously evaluated on an economic basis before plans for the geothermal project go any further.

Acknowledgements

I would like to thank Dr. Arthur Rosenfeld, Director of the Center for Building Science, at Lawrence Berkeley Laboratory for valuable comments and suggestions. I would also like to thank Randall Hayes, Jennifer Stout, and Suzanne Head at the Rainforest Action Network for making this study possible.

1. Introduction

THE GOOD NEWS is that improving energy efficiency in buildings, industry, and transportation is the most cost-effective way for Hawaii to reduce its dependence on oil imports. Sensible investments in energy efficiency can reduce electricity use in Hawaii by almost 50% and reduce oil imports by about 30%. The technologies to achieve these savings are already available—such as more energy-efficient lights, windows, appliances, motors, and cars—but building energy standards, an aggressive retrofit program, and economic incentives are needed to get these products into the market place. More importantly, Hawaii needs to implement least-cost planning for "energy-services[1]" to ensure that utilities identify all cost-effective available options for meeting new electrical demand before making any investments in more expensive new supply. In addition, to reduce dependence on fossil fuels well into the next century, the State of Hawaii must press for a national energy policy stressing the importance of energy-efficiency research and development.

Figure 1 shows that compared to pre-1973 efficiency levels, Hawaii saved about 50 trillion Btu in 1986—equivalent to 8.5 million barrels of oil worth $250 million[2]. Similarly, **Figure 2** shows that compared to pre-1973 trends, Hawaii saved 3 billion kilowatt-hours (BkWh) of electricity in 1986. The future challenge facing Hawaii is shown in the right-hand wedges of **Figures 1** and **2**. Adopting progressive energy policies will keep demand low, buying time to develop cost-effective renewable energy options like solar and wind power.

THE BAD NEWS is that since world oil prices fell in late 1985, Hawaii has lost its focus on energy efficiency, and energy use is once again in lock-step with economic growth (see **Figure 1**). Oil imports are growing, and "friendly" oil reserves in the mainland U.S. are dwindling. Developers in Hawaii are constructing suboptimal buildings and that will require expensive energy during most of their 75-100 year lifetimes. New cars and appliances imported to Hawaii are suboptimal even at today's low energy prices. Behind this bad news is the long-standing tradition that individual, industrial, and government planning horizons for efficiency investments are usually three years or less. This is true for an individual buying an appliance or car, an airline company investing in new jets, or a developer building a hotel. Conversely, for supply side investments (oil wells or power plants) we often tie up our money for more than 10 years. This "tilted" playing field has led to an over-investment in energy supply relative to efficiency. The result is a net annual energy bill which is about 30% larger than it should be, and fuel consumption and pollution nearly 50% greater than the economic optimum.

---

[1]Least-cost planning for energy servcies, hereafter referred to as least-cost planning is defined in **Appendix B**.
[2]Savings based on the current average U.S. price of $5/million Btu. The total U.S. energy bill is $400 billion for 80 quadrillion Btu, *Monthly Energy Review*, April 1989, Energy Information Agency.

THE REALLY BAD NEWS is that Hawaii is now on the verge of mortgaging its future, on a large, expensive, and risky geothermal project on the Big Island of Hawaii. The proposed 500 MW geothermal project will cost about $600-900 million to build, and the accompanying undersea cable will likely add another $300-500 million, making the total cost about $1-1.4 billion. Outside estimates range as high as $4 billion[3]. The risk involved is significant, since the geothermal resource under the east rift of Kilauea will probably be depleted if anything in excess of 5 megawatts (MW) of electrical power is extracted[4]. If the project continues as planned, the Wao Kele 'O Puna rainforest will be destroyed, seriously damaging U.S. credibility in its efforts to halt rainforest destruction worldwide.

2. Energy Efficiency and Least-Cost Planning.

To realize the potential savings shown in the right-hand wedges of **Figures 1** and **2** Hawaii must redefine its energy policy, by first of all redefining the very concept of energy. We use energy as a means to an end, not an end in itself. People aren't interested in kilowatt-hours of electricity or barrels of oil, they want the energy services that electricity and oil provide, such as: comfortable housing, quality lighting, convenient transportation, or a cold drink on a hot day. Providing the same or better quality energy services through improved energy efficiency, is the key to reducing energy demand. It is much cheaper *and* easier to reduce energy demand through improved energy efficiency, than it is to develop new and more expensive energy supply options, even if the new supply options are renewable. **Appendix A** gives an example of a large-scale conservation program initiated by the New England Electric System (NEES). NEES will spend $65 million per year (4% of its revenues), and hopes to meet 35-57% of its total electricity needs for the next 20 years through currently available efficiency improvements, while maintaining or increasing the six-state region's current rate of economic growth. For comparison, Hawaii is spending about $2 million per year on energy conservation, and this is only 0.3% of total Hawaii electric utility revenues.

A serious state-wide energy conservation program involves much more than educational efforts and energy audit programs. Hawaii needs building energy standards, financial incentives, and rebate programs to encourage consumers to invest in energy efficiency. Utility profit-making rules have to be rewritten to reward utilities for investing in the energy efficiency of their customers. Additionally, a least-cost planning policy must be adopted to ensure all available options for meeting new electricity demand are assessed before investing in new supply.

---

[3]Based on estimates by Dr. Robert McKusick and Richard Topielec, Northwest Economic Associates, 13101 N.E. Highway 99, Suite 200, Vancouver, Washington 98686-2786.

[4]Testimony of Robert W. Decker, Scientist-in-Charge, U.S. Geological Survey, Hawaiian Volcano Observatory.

At least 17 states have adopted least-cost planning strategies, and 8 other states are now in the process of evaluating least-cost planning guidelines. A least-cost planning policy must contain the following three aspects (**Appendix B** provides a detailed outline):

1) *Planning: each utility submits a least-cost resource plan.* Utilities are required to submit a long-range (10 to 20 year resource plan every two years to the state regulatory commission. The plan must include a forecast of future demand, an assessment and integration of demand-side and supply-side resource options, an implementation plan, and a non-technical summary to help facilitate public participation.
2) *Evaluation: state reviews utility plans.* Guidelines are established and a state-wide electrical energy plan must be developed to help evaluate utility plans. The state must provide for public participation in the resource planning .
3) *Enforcement: effective control over utility investments.* The state commission must have the authority to approve or reject utilities' long-range resource plan. A certificate of public need incorporating demand and supply-side options must be obtained before authorizing the siting or construction of new power plants. Additionally, the commission must have the authority to require utility conservation programs, and must encourage the development of alternative resources from small power producers (such as renewable and cogeneration).

3. California: An Example for Hawaii.

Hawaii could learn much from California, where building and appliance standards, utility programs, and market impacts have already saved ratepayers billions of dollars and helped California avoid building 10 GW of additional generating capacity[5]. California's appliance standards became the role model for the National Appliance Standards[6] that will result in savings of 44 BkWh and 13 GW of capacity nationwide by the year 2000[7]. **Figure 3** shows that California's progressive energy policies reduced per capita electricity use by 34% from 1978 to 1988, while over the same period per capita energy use in Hawaii increased 10%. Californians now use 20% less energy per dollar of GSP than Hawaiians.

The California Energy Commission

Much of California's success is due to the establishment of the California Energy Commission (CEC) in 1977. Besides writing and revising California's building and appliance standards, the CEC is also charged with:

---

[5]Savings from 1977 to 1988 are 30 BkWh and 246 trillion Btu, pp. 22,23, *Conservation Report*, California Energy Commission, October 1988, P400-88-004.

[6]National Appliance Energy Conservation Act of 1987.

[7]*Impacts of Federal Efficiency Standards for Residential Appliances*, H. Ruderman, M. Levine, J. McMahon, I. Turiel, S. Stoft, Lawrence Berkeley Laboratory, Draft Report, 1988, and Howard Geller, American Council for an Energy-Efficient Economy, 1988.

1) Submitting a biennial conservation report to the Governor and Legislature. The purpose of the report is to identify trends in the residential, commercial, industrial, agricultural, and transportation sectors; specify conservation reasonably expected to occur over the forecast period; indicate the potential for additional conservation, identify improvements to existing programs; and recommend legislative or administrative actions, programs, and policies.
2) Forecasting energy demand and supply for each utility in the state,
3) Defining and directing innovative resource projects related to both demand and supply, and
4) Approving or denying the need for new power plants, and if needed siting power plants, to ensure valuable ecological areas are protected from development.

These tasks are all open to public comment and debate.

Hawaii should follow California's example and establish an energy commission as a separate state government agency. A Hawaii Energy Commission will help promote energy conservation and assure the state meets future energy needs.

4. Geothermal Is Too Risky and Expensive.

The world's largest geothermal-power field, The Geysers located in Northern California, is running out of steam. Steam pressure at The Geysers has already dropped by 20%, and predictions are that it will drop below 50% over the next 10 years[8]. In the early 1970s it was thought that The Geysers could support 3,000 MW of power, and by 1987 about 2,000 MW were installed. Now 400 MW of capacity is standing idle. More steam is being removed than can be replaced by the hot underground magma.

There is substantial evidence to suggest a similar fate for the geothermal project in Hawaii. According to testimony given in 1982 by Robert Decker, Scientist-in-Charge of the U.S. Geological Survey's Hawaiian Volcano Observatory,

> [A]ny electrical power extraction from the Kahaule'a section of the east rift of Kilauea in excess of about 5 MW will not be [sic] replenished by new thermal power from the volcano ...[and] will probably deplete [sic] the geothermal resource.

Installing 500 MW of capacity when the east rift of Kilauea can only support about 5 MW is a big gamble.

Geothermal power is also very expensive. A recent study completed by the California Energy Commission estimated the 30-year levelized cost of geothermal power to be 12 ¢/kWh (in $1987)[9]. Since California has the largest installed capacity of geothermal power in the world, this

---

[8]Claudia Barker, Information Officer, California Energy Commission, see *Geysers Failing: Billions of Dollars May Be Lost*, Oakland Sunday Tribune cover story, November 5, 1989, pages A1, A14,

[9]*Energy Technologies Status Report*, CEC, P500-88-003D, Appendix D, Detailed Economic Analysis. Note, that the data given in Appendix D for geothermal is in $1985 (converting to $1987 yields 12 ¢/kWh). There are large variations in the cost, but this is a reasonable estimate.

has to be a reasonable estimate for Hawaii. Adding in the cost of the undersea cable to deliver the power to Maui and Oahu brings the total cost to about 14 ¢/kWh[10]. If the geothermal resource is depleted too fast, and half of the capacity is forced out of service as happened in California, the cost could double. Why should Hawaiian ratepayers be forced to pay 14-28 ¢/kWh for geothermal electricity when many other less risky, proven technologies exist? Even at 14 ¢/kWh the cost is too high.

A typical utility incentive program to reduce electricity demand by 30-40% will cost less than 4 ¢/kWh[11]. **Table 1** and **Figure 4** show the estimated savings that Hawaii could expect from a state-wide residential electricity-efficiency program[12]. **Figure 4** shows that total residential demand could be reduced by 42%, at an average cost of 3 ¢/kWh. This is almost 5 times less than the cost of delivered power from the proposed geothermal project. Similar efficiency supply curves could be developed for the commercial and industrial sectors of Hawaii, if detailed end-use data were available. These efficiency supply curves play a very important and necessary role in any utility planning process. Without accurate efficiency supply curves it is impossible to determine the least-cost demand-side options available.

5. What Other Renewable Options Are Available?

Only after all cost-effective demand-side options have been exhausted, should utilities seek new energy supply. If new supply is necessary, then geothermal must be scrutinized along with all other new resources such as biomass, solar, and wind power. A comparison of these alternatives is given in **Table 2**. The far right-hand column gives the 30-year levelized cost; including capital, operating and maintenance, consumables, insurance, and financial costs (see **Appendix C** for details). On a cost basis, biomass, solar-thermal, wind, and solar photovoltaic-concentrating power are all more cost-effective than the Hawaiian geothermal project, since they can be sited on any island without an undersea cable[13]. Solar photovoltaic-flat plate power is only about 2 ¢/kWh more than the low estimate of Hawaiian geothermal, but is much cheaper than the high estimate.

---

[10]The undersea cable would add $300-500 million to the capital cost of developing the geothermal resource. This adds 1-3 ¢/kWh or about 2 ¢/kWh to the 30-year levelized cost of the geothermal project (personal communication with G. Bemis, Califonia Energy Commission).

[11]See *Power By Design*, New England Electric System and the Conservation Law Foundation and *Analysis of Michigan's Demand-Side Electricity Resources in the Residential Sector*, LBL Report 23025, February 1987, Lawrence Berkeley Laboratory, Berkeley, CA 94720 (also see **Appendix A**).

[12]Based on rough estimates of residential electricity end-use of 40% electric hot water, 20% refrigerator, 8% lighting out of 1988 total residential use of 2045 million kWh (data from Hawaii Department of Business and Economic Development).

[13]Assuming the undersea cable adds an average of 2 ¢/kWh to the 30-year levelized cost of the Hawaii geothermal project. This cost could be higher or slightly lower, but is a reasonable estimate.

The least-cost option is improving the efficiency of sugar cane processing and cogeneration. In 1988, Hawaiian sugar cane mills provided over 450 million kWh for sale to Hawaiian electricity users, about 6% of total Hawaiian electricity use[14]. If Hawaiian sugar cane producers improve cane processing efficiency[15] and combine this with biomass gasification and steam-injected gas turbines[16] for cogeneration, they could provide much more electrcity. For example using this new technology, the 7 million metric tonnes of cane harvested and processed in 1988, could have provided almost 3 billion kWh for sale to Hawaiian electricity users—7 times more than the 450 million kWh provide in 1988 (3 billion kWh represents almost 40% of current Hawaiian electricity demand.). As shown in **Table 2**, the cost of this technology is one-third that of geothermal. Government or private financial support from outside the sugar cane industry is needed to help demonstrate this technology. With outside support, commercial systems should be available in about 3-5 years[17].

The issue of concern for biomass and solar is how much land area is required (wind isn't really an issue since the land under wind turbines can be used for pasture or agriculture). **Table 2** gives estimates of land area required per 100 MW of power production. The land area required for solar is only 2.5-4.3 times greater than geothermal, and is really not a significant issue. The land area required for biomass assumes sugar cane waste as a feedstock, so again this isn't a problem. But to provide power for Oahu with biomass, would require a long-term commitment to growing sugar cane on Oahu. This is a problem, because real estate demand could make it economically unfeasible to continue growing sugar cane on Oahu in the future. Hawaii must consider maintaining some sugar cane production on Oahu, to help meet future electricity demand, that can't be met by solar and wind power.

Table 2 shows that the lead time required for solar and wind power is small, 1.5-3 years, compared to 6 years for geothermal. These lead times are based on regulatory constraints in California which are much tougher than Hawaii. In Nevada, a solar-thermal power plant can be built in less than a year, according to Luz, the world's leading manufacturer of commercial solar electric power plants. Luz is currently producing nearly 200 MW of electricity for Southern

---

[14]Personnal communication, William Keeliside, Hawaiian Sugar, (808) 487-5561.

[15]By switching to falling-film evaporators rather the old rising-film technique to evaporate cane juice into sugar, see *Process Energy Efficiency and Cogeneration in Cane Sugar Factories*, J.M. Ogden, S. Hochgreb, M. Hylton, Proceedings of 20th Congress of International Society of Sugar Cane Technologists, Sao Paulo, Brazil, 1989.

[16]Biomass gasification with steam-injected gas turbines can produce about 450 kWh/tonne of cane (includes bagasse and some tops and leaves of cane), with 25 kWh/tonne going to processing, yielding 425 kWh/tonne for sale to Hawaiian electricity customers. In 1988, 7 million tonnes of sugar cane was produced, and this much cane could have provided 3 billion kWh of electricity to Hawaiian electricity users, almost 7 times more than the 450 million kWh produced in 1988.

[17]For more on gasification and hot gas cleanup systems for use with steam-injection gas turbines, see *Biomass Gasification for Gas Turbine Power Generation*, Eric Larson, Per Svenningsson, Ingemar Bjerle, pp. 697-739, *Electricity: Efficient End-Use and New Generation Technologies and Their Planning Implications*, T. Johansson, B. Bodlund, R. Williams, Editors, ISBN 91-7966-065-7, Lund University Press, Lund, Sweden, 1989.

California Edison (SCE), and recently began building another 400 MW of capacity for SCE. When completed, Luz's production of solar electricity will total almost 600 MW, enough electricity to serve the residential needs of over 800,000 people, as many people as live in Honolulu. Solar and wind power are cheaper than geothermal, and should be given a high priority in any discussion of new power resources for Hawaii. Of course, this is only after all cost-effective energy-efficiency measures have been implemented.

6. Conclusion.

If the geothermal resource on the Big Island of Hawaii is developed as planned, the Wao Kele 'O Puna rainforest will be destroyed, seriously damaging U.S. credibility in its efforts to halt rainforest destruction worldwide. It would be tragic for this to happen, since on a least-cost basis, the geothermal project does not make economic sense. Improving energy efficiency in Hawaii over the next 10 years can reduce electricity demand by almost 50% at an average cost of less than 4 ¢/kWh. This is almost 5 times less than the cost of providing power from the proposed geothermal project and accompanying undersea cable. The "bottom line" is that the geothermal project is risky, very expensive to build and maintain, and comes with no guarantees. On the other hand, a state-wide energy efficiency program using proven technology, will free up more power than the geothermal project could ever provide, will save Hawaiian ratepayers hundreds of millions of dollars, and will buy precious time to develop solar and wind power over the next 10-20 years.

The choice is simple, the geothermal project and accompanying undersea cable do not make economic sense. A least-cost planning policy would have brought this fact to light before any money was spent, but no such planning policy exists yet in Hawaii. The Hawaii Public Utility Commission and state legislators are currently evaluating least-cost planning proposals, but nothing has been implemented. Hawaii must move forward and develop a least-cost electricity planning process to ensure that all available options for meeting new electricity demand are assessed before investing in new supply. Utility profit-making rules have to be rewritten to reward utilities for investing in the energy efficiency of their customers, and building energy standards must be implemented and enforced. If new sources of supply are required, then state energy planners must make every effort to develop solar and wind power, and improve the efficiency of electricity generation from sugar cane bagasse, since all of these technologies are currently cheaper than geothermal power. All available resource options must be seriously evaluated on an economic basis before plans for the geothermal project go any further.

Table 1. Proposed Electricity-Efficiency Measures for the Hawaii Residential Sector. Savings of 866 million kWh—42% of total residential demand in 1988—are achievable at an average cost of conserved electricity of 3 ¢/kWh. Note that the state-wide savings assume full replacement of the estimated existing number of units.

Efficiency Measure	Added Retail Cost *$*	Annual Electricity Savings *kWh/yr*	Life *Years*	Cost of Conserved Electricity[18] *¢/Kwh*	Estimated Number Units *Thousands*	State-Wide Savings *Million kWh/yr*
R-10 Water-Heater Blanket	25	650	10	0.6	215	140
Water-Saving Showerhead	20	310	10	0.9	215	67
Compact Fluorescent Lamp[19]	12	88	6.8	2.6	1,500	132
Heat-Pump Water Heater	650	2280	10	4.0	215	490
1989 Best Mass-Produced Refrigerator[20]	60	125	15	4.6	292	36.5
Average Cost of all Measures				3.0		
Total Savings						866

[18]The Cost of Conserved Electricity (CCE) is calculated using $CCE = \left(\frac{\text{Cost of Measure}}{\text{Annual Savings}}\right) \times CRF$, where CRF is the Capital Recovery Factor, and $CRF = \frac{d}{1-(1+d)^{-n}}$, where d = the real discount rate, n = life of investment. A 7% real discount rate was used for all calculations.

[19]Compact flurescent lamps cost about $20, but the marginal cost is only $12, since they last 10,000 hours, and replace a string of ten 75W incandescent bulbs whose present cost is $8. The life was calculated as follows: 10,000 hrs + (4 hrs/day X 365 days/yr) = 6.8 yrs.

[20]Annual electricity savings are based on comparing the 1989 best mass-produced refrigerator, that uses 840 kWh/yr, to the 1990 National Appliance Standard for refrigerators of 965 kWh/yr. The U.S. average for refrigerators is about 1400 kWh/yr. Average life for refrigerator based on Department of Energy data.

Table 2. Estimated Cost of Selected Renewable Electricity Generating Technologies. For comparison on land area estimates, Hawaii currently has about 2 million acres of agricultural land. Source: Except for biomass estimate (footnote), all land areas, lead-time, and cost estimates are from the California Energy Commission (for reference see **Appendix C** which gives spreadsheets on cost data).

Technology	Lead Time *Years*	Area Required *Acres/100 MW*	30-Year Levelized Cost *¢/Kwh*
Improved Efficiency in Sugar Cane Processing and Cogeneration (Biomass Gasification using Steam-Injected Gas Turbines)	3-5[21]	2[22]	4.1[23]
Solar-Thermal Parabolic Trough Hybrid	1.5	500	8.7
Geothermal (without cable)[24]	5.5	200[25]	12.0
Wind	1.5	1750[26]	12.3
Solar Photovoltaic-Concentrating	3	860	13.2
Solar Photovoltaic-Flat Plat	3	800	15.9
Hawaii's Geothermal with Undersea Cable[27]	6	?	14 Low 28 High

[21]Estimated time to demonstrate the technology is 3-5 years. Estimated construction lead-time would be about 2-3 years once the technology is commercially available.

[22]This estimate is based on using bagasse, a byproduct from crushing sugar cane. No extra land is required beyond existing cane processing plants except for the gasifier.

[23]See *Biomass-Gasifier Steam-Injected Gas Turbine Cogeneration for the Cane Sugar Industry*, Eric Larson, R. Williams, J.M. Ogden, M. Hylton, presented at Energy from Biomass and Waste XIV, Lake Buena Vista, Florida, January 29-February 2, 1990.

[24]Based on The Geysers in California, *Technical Assistance Manual*, Vol. 1, Ed. 3, CEC, P300-84-013, June 1984.

[25]Does not include land required for piping steam from well-head to generation station, or land for reservoirs for holding waste water.

[26]Although this much land is required, the land underneath the wind turbines can be used for grazing or agriculuture as done in California.

[27]The Hawaii undersea cable add-on cost is about 2 ¢/kWh. The high estimate assumes the geothermal resource gets depleted, and capacity is cut by 50% (as has been predicted for The Geysers in California).

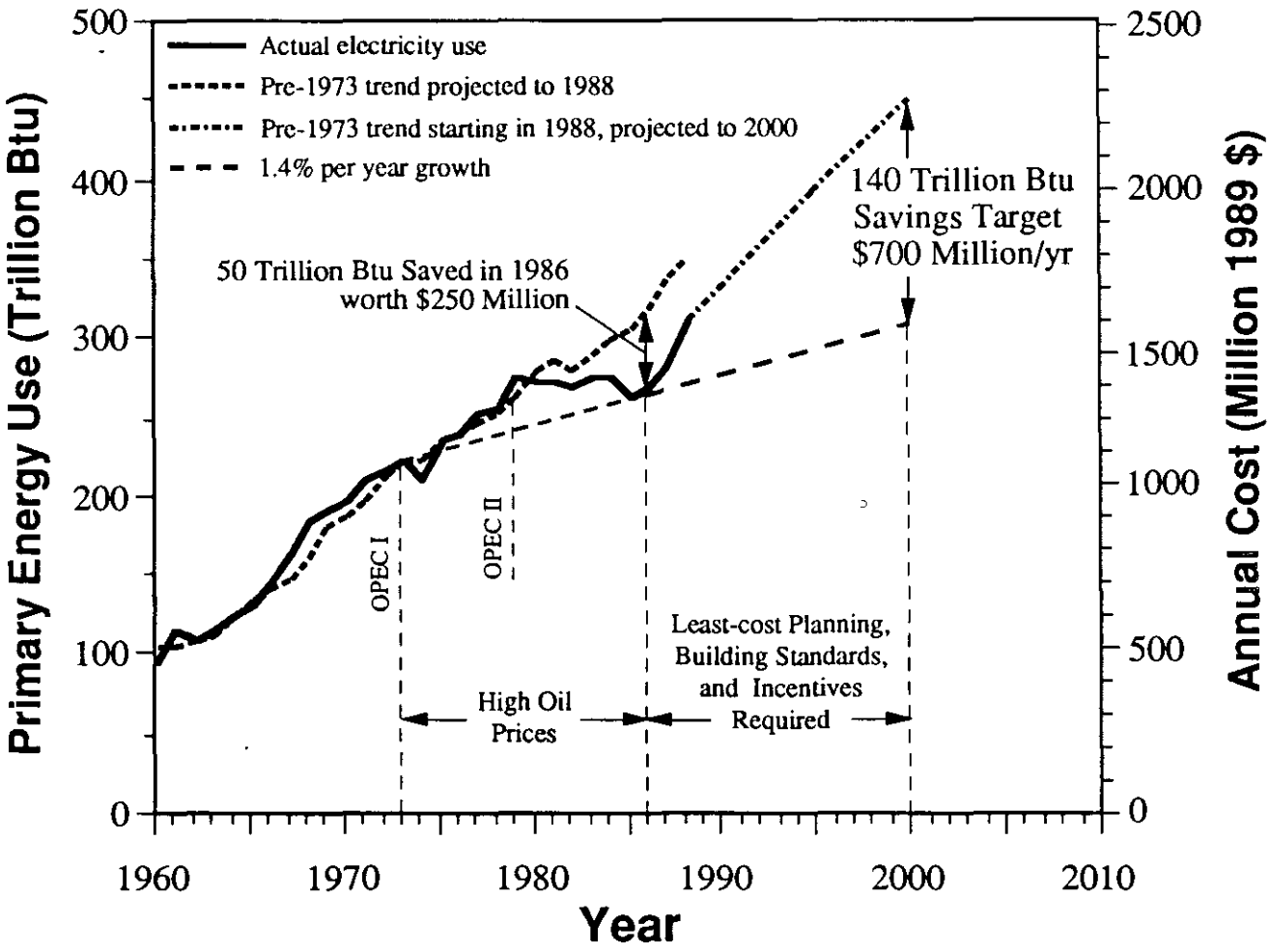


Figure 1. Hawaii Energy Use: Actual and Predicted by Gross State Product (GSP). Hawaii's target of opportunity for improved efficiency in industry, buildings, and transportation will total more than 140 Trillion Btu (24 million barrels of oil) by the year 2000—worth $700 million. The figure shows two "wedges" of energy savings.

(a) The left-hand wedge shows savings *actually achieved* by Hawaii from 1973 to 1986. Before 1973 energy use was in lockstep with GSP. From 1973 to 1986 high oil prices limited energy growth to only 1.4%/year while GSP rose 3%/year.

(b) The right-hand wedge represents the *future challenge* for Hawaii. Low oil prices since 1986 have caused total energy use to grow faster than GSP—worse than the pre-1973 period. If energy use rises at only 3%/year (like GSP), Hawaii will have to import an additional 24 million barrels of oil annually by the year 2000. To reduce energy demand, Hawaii must implement a least-cost planning program, building standards, an aggressive retrofit program on existing buildings, and revenue-neutral incentives to encourage better fuel efficiency for cars and trucks. On the national level, Hawaii must push for tighter standards on appliances and automobiles, and revenue-neutral incentives to encourage airline companies to purchase the most fuel-efficient jets available.

Sources: Energy use—State Resources Coordinator Annual Report, July 1987 to June 1988, Hawaii Department of Business and Economic Development, Honolulu, HI. Projections based on 1988 energy use and GSP. All GSP data, including projections to 2000, are from the Hawaii Department of Commerce and Consumer Affairs.

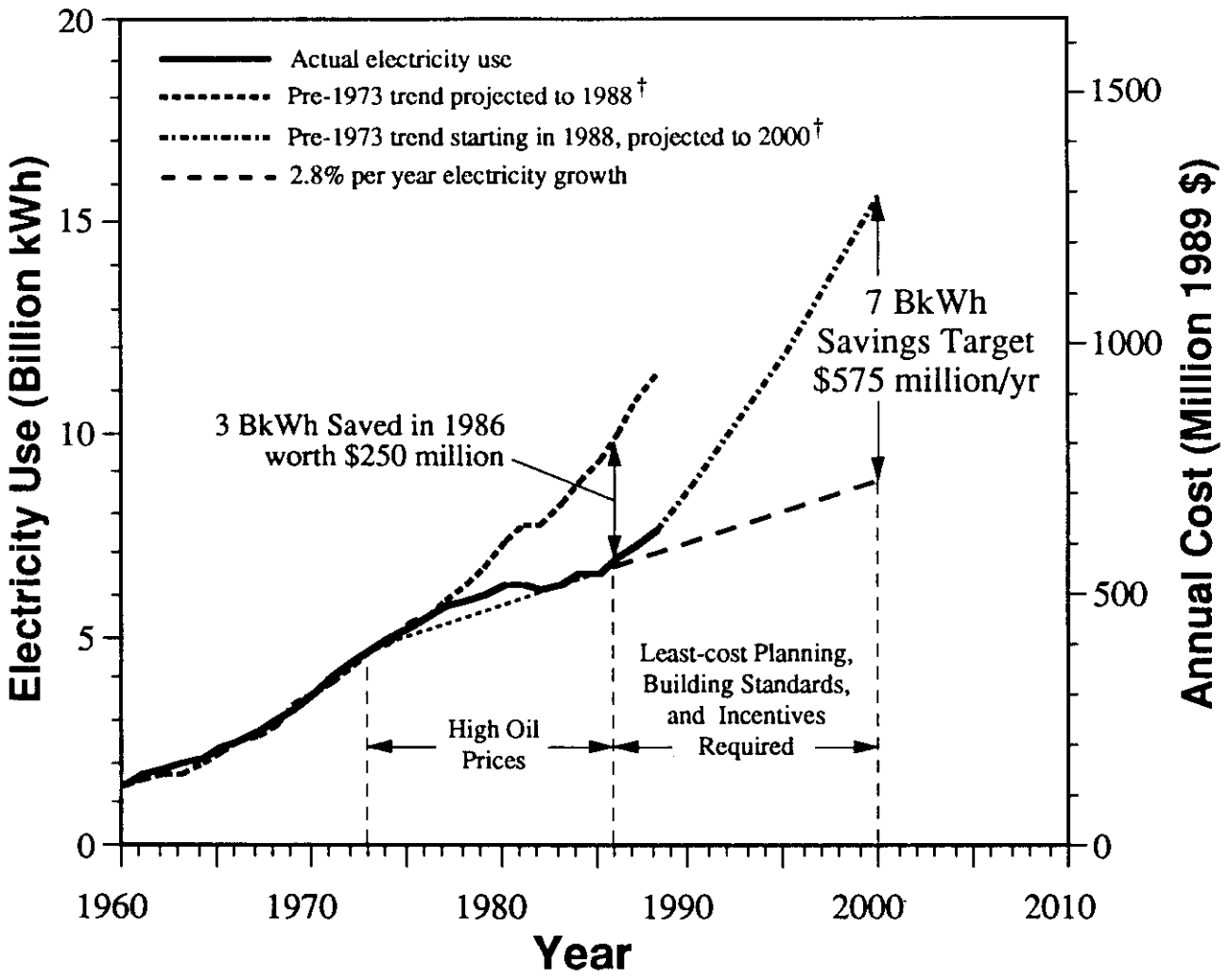


Figure 2. Hawaii Electricity Use: Actual and Predicted by Gross State Product (GSP). Hawaii's target of opportunity for improved electricity efficiency in industry, and buildings will total more than 7 billion kilowatt-hours (BkWh) by the year 2000—worth $575 million. The figure shows two "wedges" of energy savings.

(a) The left-hand wedge shows savings *actually achieved* by Hawaii from 1973 to 1986. Before 1973 electricity use grew by about 9%/year which is 4% faster than GSP†. From 1973 to 1986 high oil prices limited both GSP and energy growth to only 3%/year.

(b) The right-hand wedge represents the *future challenge* for Hawaii. Low oil prices have caused Hawaii to lose its focus on energy efficiency, and electricity use is rising once again at pre-1973 growth rates. If this trend continues, demand will double to about 15 BkWh by the year 2000. A least-cost planning program combined with building energy standards and an aggressive retrofit program on existing buildings could save about 7 BkWh, and eliminate the need for additional generating capacity.

---

† The pre-1973 trend is $\text{Electricity}_t = \text{Electricity}_{1973}\left(\frac{\text{GSP}_t}{\text{GSP}_{1973}}\right)(1.028)^{(t-1973)}$

Sources: Electricity Use—State Resources Coordinator Annual Report, July, 1987 to June 30, 1988, Hawaii Department of Business and Economic Development, Honolulu, HI. Projections from 1988 to 2000 based on 1988 electricity use and GSP. All GSP data, including projections to 2000, are from the Hawaii Department of Commerce and Consumer Affairs.

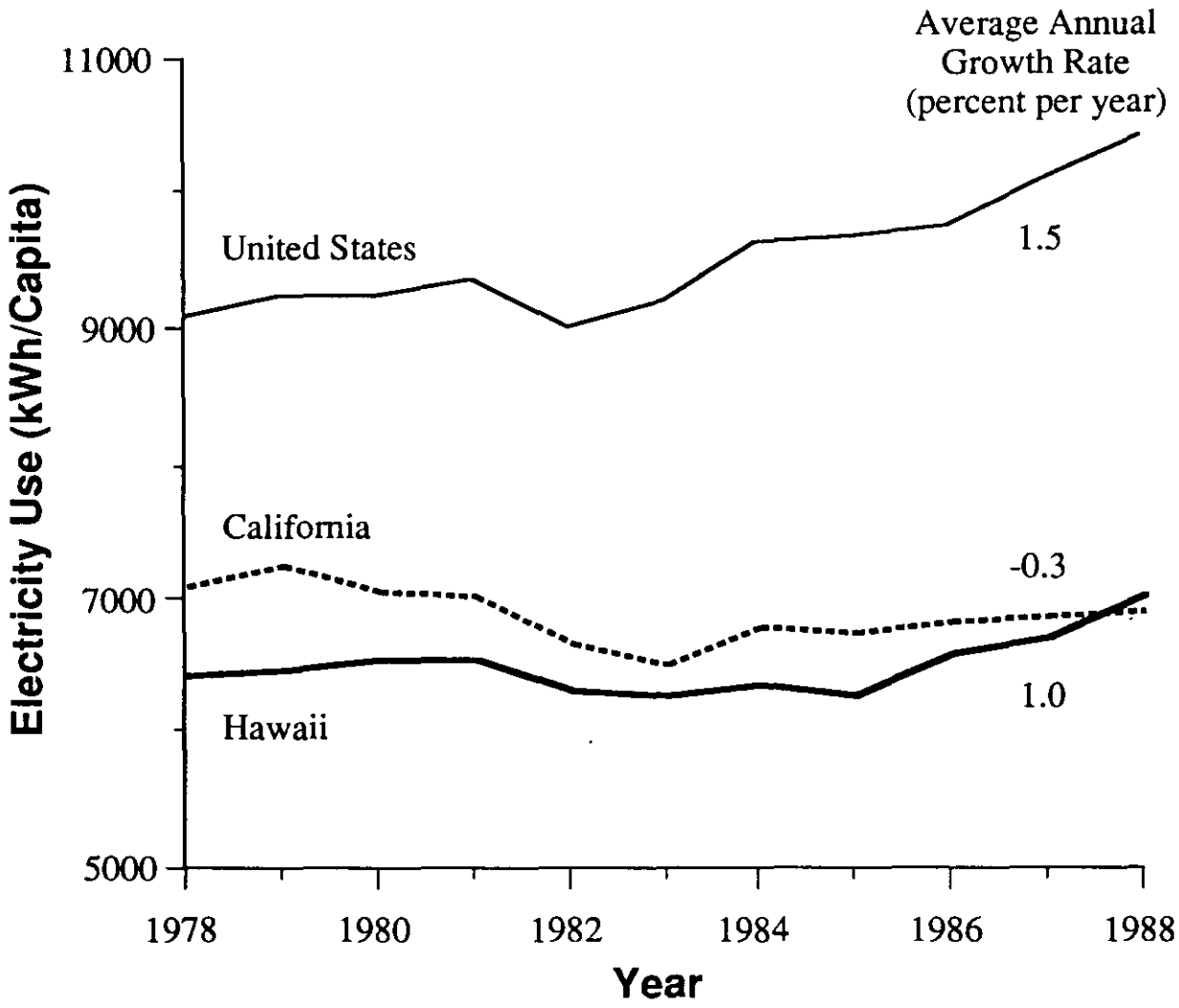


Figure 3. Per Capita Electricity Use in Hawaii, California, and the United States, 1978-1988. California's building and appliance standards, and least-cost planning programs have significantly reduced per capita electricity use over the past decade. In 1988 the average Californian used 210 kWh less than in 1978, while in 1988 the average Hawaiian used 580 kWh more than in 1978.

Source: Electricity data—*Electric Power Annual*, DOE/EIA-0348(87), and DOE/EIA-0348(82), U.S. Dept. of Energy, Energy Information Agency. Population data—*Statistical Abstract of the United States*, 1989 ed., U.S. Dept. of Commerce, *Statistical Abstract of California*, and Hawaii Dept. of Commerce and Consumer Affairs.

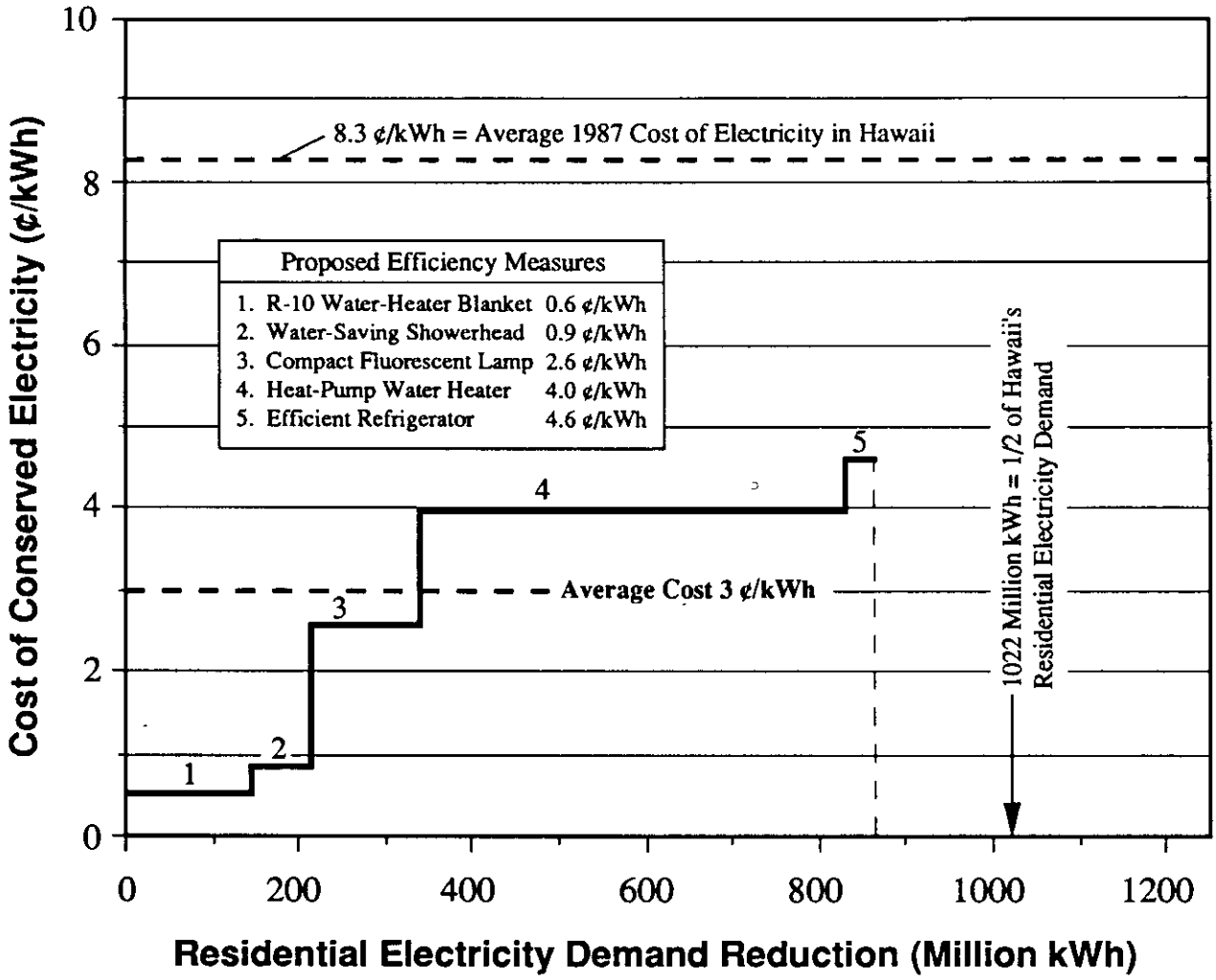


Figure 4. Residential Electricity-Efficiency Supply Curve for Hawaii. If Hawaii invested in a state-wide efficiency program, total residential electricity demand could be reduced by 42%, at an average cost of 3 ¢/kWh, saving 866 million kWh. The average cost to Hawaiian ratepayers is 4 times less than the proposed geothermal project.

Note: A 7% real discount rate was used for the analysis. The marginal retail cost of each efficiency measure was used to calculate the cost of conserved energy. For more detail see **Table 1.**

APPENDIX A

Power By Design:
The New England Electric System Energy Efficiency Plan

Excerpted from *NEES Will Spend $65 Million A Year On Conservation*, by Susan Lincoln, p. 4, *The Energy Daily*, Tuesday, November 7, 1989.

NEES Will Spend $65 Million A Year On Conservation

BY SUSAN LINCOLN

New England Electric System, the second largest utility in the six-state region, is embarking on a $65 million per year search for a new source of energy. Oil has not been discovered in Boston harbor, nor coal in Vermont, but NEES hopes to find megawatts in New England's homes, businesses, and factories.

NEES will be investing its millions in energy-efficient light bulbs, air conditioning, electric motors and building design, according to the Westborough, Massachusetts-based utility. Another $500 million will be spent in New England for energy efficiency measures over the next three years.

A twist in the venture is a partnership with the Conservation Law Foundation, an environmental group traditionally at loggerheads with energy utilities. CLF and NEES are collaborating in the new program called "Power by Design," which aims to ease the region's increasingly tight electricity supply and avoid building new power plants by tapping into energy efficiency.

While CLF portrays the program as "a stroke of genius" and takes much of the credit for spurring the utility to action, energy efficiency has been a company priority "well before CLF entered the picture" said a NEES spokesman. NEESPLAN, the utility's overall strategic plan has included reducing electricity use through conservation and efficiency since 1979, according to NEES president John Rowe.

Douglas Foy, executive director of CLF, dubbed the project the "third generation" of energy conservation. The first was the hardship model, turning down thermostats, foregoing electric blankets and wearing sweaters, Foy said. The second generation was efforts to get consumers to buy energy efficient appliances by offering rebates, performing energy audits and similar incentive programs.

Yet these programs never seemed to take off. The missing piece was a clear profit motive for the electricity supplier, the utility. Without the ability for the utility to earn a return on the investment, Foy explained, conservation measures were doomed to remain good public relations, without serious impact on utilities' projections of future energy needs and their plans for new facilities.

Enter CLF. The group co-authored a report in 1987 titled *Power to Spare*. The report concluded that New England could meet between 35 percent and 57 percent of its total electricity needs for the next twenty years through currently available efficiency improvements, while maintaining or increasing the region's current rate of economic growth. The energy supplied through efficiency would cost between one-quarter and one-half the price of kilowatts supplied from new power plants.

Lack of utility action or investment was identified as a key obstacle to consideration of conservation. *Power to Spare* concluded that energy efficiency is a resource that should be purchased like any other resource, not left to customers to finance.

The crucial difference, Foy says, is to switch the utilities from a goal of selling kilowatt hours to selling energy services. It's a return to the ideas of Thomas Edison, Foy pointed out. The inventor's original company sold light, not kilowatt hours. If those services can be provided to the consumer for less kilowatts, no one loses—neither the consumer nor the utility—and the environment gains in avoiding the need for new plants. Utilities also avoid the risky and resource-consuming task of trying to build new capacity.

So in 1988 CLF took their case to four of the utilities commissions in the New England region and won converts. With "various degrees of coercion" state regulatory commissions in the area ordered the utilities to put conservation on a "level playing field" with new power generation, said CLF staff attorney Stephen Burrington.

First to get off the ground was NEES. The Massachusetts Department of Public Utilities ordered the utility company to work with former adversary CLF to design and implement state-of-the-art energy efficiency programs. Since such large scale direct investment in energy efficiency by utilities is unprecedented, the jointly-designed program was to include rigorous monitoring and evaluation provisions, open to revamping as experience grows.

Now the "Power by Design" plan is set to launch, and has already begun by retrofitting low-income houses in Worcester, Massachusetts. The first year of the plan sets a goal of 60,000 homes and 15 million square feet of office space to retrofit and redesign. NEES will spend over $65 million this year alone.

The program blazes some new ground in utility-sponsored energy efficiency programs, according to CLF's Burrington. First is the scale of the project, and the direct utility involvement, rather than indirect consumer incentives programs. "It represents the first attempt by a utility to really go after energy efficiency," said Burrington.

NEES will pay for the additional expense of designing an energy-efficient heating and cooling system for new buildings. For existing buildings, the utility will replace regular light bulbs with energy-efficient bulbs which use one quarter of the electricity and last ten times as long as incandescent bulbs—all at no cost to the homeowner or business.

Second is a more complex, but crucial bookkeeping change. Previously, utilities wrote off investments in energy conservation as expenses. The cost of conservation investments were applied for that year only, providing a lower rate of return than investments in new generation that were ratebased, or subject to long-term amortization.

NEES has worked out a cost-recovery deal with the utility commissions where conservation investments can be included in the ratebase, earning interest on the investment equal to capital sunk in new generating capacity. As an additional carrot, the rateseters are allowing an extra return to be earned by the utility.

Although ratebasing efficiency measures has been tried before, for example in Wisconsin, the New England case is different because the cost-recovery plan is tailored to encourage cost-effective energy efficiency measures, according to Burrington. In addition, the utility commission has agreed to let the price per kilowatt to rise, making up for the potential overall decrease in demand.

Susan Lincoln is a reporter for **Environment Week**, *a sister publication to* **The Energy Daily**.

APPENDIX B

A Model Least-Cost Electrical Policy

Excerpted from *A Brighter Future: State Actions In Least-Cost Electrical Planning*, by Lisa Shapiro, Paul Markowitz, Nancy Hirsh, The Energy Conservation Coalition, A Project of Environmental Action Foundation, 1525 New Hampshire Avenue, N.W., Washington, DC 20036 (202) 745-4874

A Model Least-Cost Electrical Policy

This triad, planning, evaluation and enforcement, provide a framework for evaluating how well your state is ensuring utility investments in least-cost electrical resources.

A. PLANNING: EACH UTILITY SUBMITS A LEAST-COST RESOURCE PLAN

Planning requirements ensure that utilities have identified all available options for meeting new electrical demand before making large expenditures.

Are your utilities required to file long-range resource plans?

Each utility should be required to submit a long-range (ten or twenty years) resource plan every one or two years to the state regulatory commission. Comprehensive utility plans should include all of the following components:[2]

a. Forecast of Future Demand: Utilities should file forecasts of future electrical demand which identify two-to-three possible scenarios for demand growth to help account for the large degree of uncertainty regarding future energy consumption. Demand forecasts should utilize a combination of the following forecast methodologies:

End-use analysis: This methodology calculates the number, type and efficiency of electrical end-uses (e.g. water heaters, lighting, industrial motors) in each customer class. It incorporates the impacts of changes in efficient technologies, appliance saturation levels, and utility sponsored conservation programs.

Econometric analysis: This methodology examines the impact of economic changes (e.g. increases in personal income, population growth, price increases in alternative fuels) upon electricity consumption.

b. Assessment of Supply-Side Resource Options: Utility plans should specify how the utility intends to meet future demand through various supply-side options, including: renewable energy resources (e.g. wind, solar, geothermal, hydro power, biomass), cogeneration, power purchased from other utilities, and traditional sources such as coal and nuclear power.

c. Assessment of Demand-Side Resource Options: Utility plans should document that utilities are making every effort to achieve the full potential for cost-effective conservation and load management investments. Plans should document not only the cost-effective potential for these investments, but also specify planned and proposed programs which are designed to achieve this potential. Utility conservation programs should go beyond educational efforts and energy audit programs to include financial incentives, such as low-interest loans, cash rebates, and third-party financing, designed to stimulate customer conservation investments.

d. Integration of Supply and Demand-Side Resource Options: The cornerstone of a least-cost plan is a side-by-side evaluation of the relative cost-effectiveness of all supply and demand-side resource options. The plan should detail the resource mix of those investments that will provide electrical service at the least possible cost. A separate least-cost mix should be developed for each demand growth scenario.

e. Two Year Implementation Plan: Each utility should submit a separate two year plan that specifies how it will implement its long-range resource plan. This implementation plan should specify exactly which resources the utility expects to acquire in the upcoming two-year period.

f. Plan Summary: The plan should include a non-technical summary of the utility's projected load forecast and proposed resource options for meeting load to help facilitate public participation.

B. EVALUATION: STATE REVIEWS UTILITY PLANS

State evaluation of utility resource plans (and other utility filings) is essential to assess whether utilities have adequately fulfilled their filing requirements and have adequately examined alternative supply and demand-side options.

Has your regulatory commission established specific guidelines for utility plans and other filings?

The state regulatory commission should set guidelines that specify what information is required and which methodologies should be used by utilities in preparing their resource plans. These guidelines should use state-of-the-art approaches, and assure consistency among utility plans and systematic review by all interested parties. For example, the commission should establish specific regulatory criteria and develop a standard set of methodologies to evaluate the cost-effectiveness of utility conservation programs.[3]

Has your state developed a state-wide electrical energy plan?

An independent state energy plan should be developed and updated every two years. This plan should follow the same guidelines established for the preparation of utility plans and be a standard against which to evaluate utility plans. This plan can be conducted by the commission itself, another state agency (e.g. state energy office), or an independent research institution (e.g. state university). A comprehensive state plan should contain scenarios of future electrical demand, assessments of alternative supply and demand-side resource options, and an analysis of various policy options which can be implemented to achieve a least-cost strategy.[4]

Does your Commission have special provisions for public participation in the resource planning process?

The commission should hold open hearings to review and examine proposed utility resource plans. Public involvement in the review process is necessary to: 1) inform the public and legitimize the process. 2) ensure consideration of all potential resource options and the consideration of all potential impacts of utility plans; 3) ensure commission and utility accountability; and 4) enhance public acceptance.[5]

The least-cost planning process should also include opportunities for informal review sessions among consumer groups, the business community, local energy researchers and individual citizens as the plans are developed. This will help utilities incorporate a wide range of input into their resource plans.

Funding mechanisms should be developed to ensure the establishment of public representation in the utility planning process, plant licensing and/or ratemaking proceedings. For instance, citizen utility boards (CUBs) are funded through voluntary contributions from ratepayers through access to utility bills.[6] On the other hand, a state utility consumer advocate is often funded through a surcharge on utility bills.[7]

C. ENFORCEMENT: EFFECTIVE CONTROL OVER UTILITY INVESTMENTS

The commission should have sufficient regulatory powers during the planning, powerplant licensing and ratemaking processes to effectively ensure utility investments in least-cost resources.

Does your commission have the authority to approve or disapprove utilities' long-range resource plans?

Your commission should have the authority to reject utility resource plans that do not satisfy established regulatory guidelines and require utilities to revise inadequate plans.[8] These guidelines can be procedural in nature, i.e requiring utilities to meet specific information requirements, and/or can be substantive, i.e. requiring utilities to devise specific programs or meet specific conservation goals. State authority to approve or disapprove utility resource plans should be strongly tied to its ability to evaluate the utility load forecasts and resource assessments.

One of the most crucial elements of a comprehensive least-cost planning process is the requirement that all utility investments be consistent with utility resource plans. States with this essential provision are able to use utility resource plans for their optimal functions: as a benchmark on how the utility proposes to meet future electrical demand before the investments have been made.

Does your state require a certificate of public need before authorizing the siting or contruction of new power plants?

States should exercise control over the siting and/or construction of new power plants by requiring a certificate of need (often referred to as a certificate of public convenience and necessity) in which the utility must establish the need for the power plant. A certificate of need should only be issued when:

1. *The plant is in compliance with the utility's resource plan:* Permits for new plants should only be considered if the plant is consistent with the utility's most recently approved resource plan. This ensures integration and consistency of utility investments with the utility planning process.[9]
2. *The need for the plant has been firmly established:* Utility demand forecasts should be scrutinized in light of state-conducted forecasts, for compliance with state specifications, and to account for any changes which may have occurred since the resource plan was filed.[10]
3. *The plant is the least-cost means of meeting the need:* Utilities should be required to demonstrate that the proposed plant is the least-cost option in light of all available demand-side and supply-side options.

Further, the commission should have the authority to review the certificate of need every two years in light of any changes in the utility's approved resource plan, with the burden of proof resting on the utilities. Again, state authority to require a certificate of need should be strongly tied to its ability to evaluate proposed utility power plants in light of least-cost alternatives. Further, the commission should still maintain the authority to disallow imprudent costs from the rate base.

Has your commission used its ratemaking powers to encourage utility least-cost investments?

Ratemaking authority is important as a final check to ensure least-cost investments, but is most effective when used in conjunction with comprehensive planning and plant licensing processes. Proposed rate increases should be evaluated in the context of the utility's most recently approved resource plan, and rate recovery should be allowed only for those investments which have been included in the plan. Further, the commission should develop regulatory guidelines for what constitutes used and useful investments to assure that uneconomic utility expenditures are disallowed from the rate base.

Does your commission have authority to require utility conservation programs?

Your commission should have regulatory authority to require utilities to offer financial incentives designed to stimulate customer investments in energy conservation, such as low-interest loans or cash rebates. While most commissions are granted specific statutory authority to require these investments, many commissions have relied on broad regulatory powers to ensure "adequate and reasonable supplies of electricity" as the legal basis for requiring conservation investments.[11]

A few state commissions offer utilities financial incentives and/or impose financial penalties to encourage conservation investments. For instance, some commissions provide revenue guarantees to utilities for innovative or untested resource investments (e.g, pilot conservation programs). Other commissions are moving toward performance based financial incentives whereby utilities are rewarded or penalized according to their progress in achieving certain efficiency goals, rather than a strict rate-of-return on total assets. In this manner, commissions can reward or penalize a utility based upon progress toward achieving conservation goals or implementing its resource plan.[12]

Has your commission set avoided cost rates which require utilities to purchase electricity from small-power producers?

The Public Utilities Regulatory Policies Act (PURPA) of 1978 (Title I of the National Energy Act) requires electric utilities to purchase electricity from small-power (renewable energy and cogeneration) producers at a price equal to the utility's cost of producing electricity. Your commission should establish rates that reflect the long-term cost of building new power plants. This will maximize the development of alternative resources, while assuring lower rates for all ratepayers.

REFERENCES

1. Markowitz, Paul and Joseph Kriesberg, *Least-Cost Electrical Planning: Is There Really a State Movement*. Critical Mass Energy Project, 215 Pennsylvania Ave., SE, Washington, DC $3.50 (December 1985).
2. For example, see 704 Nevada Administrative Code, Sections 900-955 (Oct. 1984). Contact the Nevada Public Service Commission, 505 East King St., Carson City, NV 89710.
3. For example, see 25 Florida Statutes Annotated, Section 17 (1985). Contact the Florida Public Service Commission, 101 East Gaines St., Tallahassee, FL 32301.
4. For example, see Illinois Statutes Annotated, Section 8-402 (h) (1985). Contact the Illinois Commerce Commission, 527 East Capitol Ave., Springfield, IL 62706.
5. Northwest Electric Power Planning and Conservation Act, Public Law 96-50, Section 4 (g) (1) (1980). Contact the Northwest Power Planning Council, Suite 1100, 850 S.W. Broadway, Portland, OR 97205.
6. For more information, contact the Citizen Utility Board Organizing Project, 215 Pennsylvania Ave., SE, Washington, DC 20003 (202-546-9707).
7. For more information contact the National Association of State Utility Consumer Advocates, 1424 16th St., NW, Suite 105, Washington, DC 20036.
8. For example, see 196 Wisconsin Statutes, Section 491 (2) (1975). Contact the Wisconsin Public Service Commission, P.O. Box 7854, Madison, WI 53707.
9. For example, see 704 Nevada Administrative Code, Section 890 (Oct. 1984). See address above.
10. For example, see Texas Substantive Rules, Article VII, Section 54(e)(1) (July, 1985). Contact the Texas Public Utilities Commission, 7800 Shoal Creek Blvd., Austin, TX 78757.
11. For example, see New York Public Service Commission, Opinion #84-15, Case 28223 (May 21, 1984). Contact the New York PSC, Empire State Plaza, Albany, NY 12223.
12. For example, see 66 Kansas Statutes Annotated, Section 117(a) (1985); and 366 Florida Statutes Annotated, Section 82(4) (1980). Contact the Kansas Corporation Commission, State Office Building, Topeka, KS 66612.

APPENDIX C

Detailed Cost Data
Renewable Electricity Generation Technologies

Excerpted from *State of California Energy Resources Conservation and Development Commission, Final Report: Technology Characterizations,* prepared for the 1990 Electricity Report (ER 90), Docket No. 88-ER-8, Gerald R. Bemis, Arthur J. Soinski, Samuel Rahkin, Alec Jenkins, Roger L. Johnson, California Energy Commission, and Michael Radovich, Ebasco Environmental, October 1989.

TECHNOLOGY: PARABOLIC TROUGH SOLAR HYBRID--FUTURE TECHNOLOGY
HIGH/LOW CASE:
PEAKING/BASELOAD:
PLANT CAPACITY: 160 MW
END USER: UTILITY

COST OF ENERGY FROM ETSR TECHNOLOGY:

	1987 $: Cents/kWh	1987 $: $/kW-Yr	1995 $: Cents/kWh	1995 $: $/kW-Yr
Capital:	3.5	227.7	5.2	341.6
O&M:	0.9	61.7	1.4	92.5
Cons:	0.0	0.0	0.0	0.0
Fuel:	4.3	282.8	6.5	424.2
TOTAL:	8.7	572.2	13.1	858.3

PLANT CAPITAL COST:

Capital Cost ($/kW peak): (Incl.AFUDC & O.Cst)			1780 (Base Yr)		2671 (Oper.Yr)	
Year Prior to Year(co):	-5	-4	-3	-2	-1	0
Cash Flows (%):	0.00%	0.00%	0.00%	0.00%	6.00%	94.00%
Interest During Construction:			10.98%	5.49%(Real)		
Escalation of Capital Cost Prior to Operation:			5.20%	0.00%(Real)		
Owner's Costs:			0.00%			
Resale/Salvage Value (% Cap. Cost):			0.00%			

PLANT OPERATION PARAMETERS:

Year Commercial Operation:	1995	
Plant Capacity Factor (CF):	75%	6570 Hrs
Plant Life (Years):	30	

OPERATING PARAMETERS (Base Year $):

Operating & Maintenance Costs (O&M):		
Fixed ($/kW-Yr):	27.00 (Base Year)	
Variable (Mills/kWh):	0.50 (Base Year)	
Consumables Cost ($B/Lb):		
Consumables Rate (Lb/kWh):		
Fuel Costs (F) ($/MBtu):	2.70 (Base Year)	
Heat Rate (HR) (Btu/kWh):	8650	
Thermal Energy Rate (MBtu/kWh):		
Solar Fraction:	33.49%	2200 Hrs

ECONOMIC PARAMETERS:

Base Year (Dollars):	1987
Inflation Rate:	5.20%
Investment Period (Years):	30

FLAGS:

	FOR:
Exclude (1) vs. Include (0) Interest Tax Shelter:	1 Cost of Capital
Normalized (1) vs. Flow Through (0):	1 Accounting

FINANCIAL PARAMETERS (After Income Tax):

COST OF CAPITAL (DISCOUNT FACTOR)

Cost of Common Equity (ke):	12.740%	7.17%(real)
Cost of Preferred Stock (kp):	9.290%	3.89%(real)
Cost of Debt Financing (kd):	9.290%	3.89%(real)
Percent Common Equity (C/V):	49.00%	
Percent Preferred Stock (P/V):	6.00%	
Percent Debt Financing (D/V):	45.00%	
Cost of Capital:	10.98%	5.49%(real)

DEBT COVERAGE:

Coverage Ratio:	CR =	3.58

FIXED CHARGE RATE:

FCR	0.128	0.072 (real)

TAX PARAMETERS:

Marginal Federal Income Tax Rate (T):	34.00%
Marginal State Income Tax Rate (t):	9.30%
Effective Marginal Income Tax Rate (T'):	40.14%
State Sales Tax Rate (ts):	6.00%(effective)
Other Taxes (Property) (to):	1.14%
Federal Investment Tax Credit (ITC):	0.00%
Federal Energy Tax Credit (FETC):	0.00%
State Energy Tax Credit (SETC):	0.00%

DEPRECIATION:

Federal: MACRS-DB		5 Yrs
SL		Yrs
Base		100.00%
State: SYD		12 Yrs
SL		Yrs
Base		100.00%
Capital Depreciation Base:		94.00%
In-service month (1..12):		6

PLANT CAPITAL COST ($/kW):

	1987 $:	1995 $:
Overnight Construction Cost:	1674	2671
Total Plant Cost:	1780	

ESCALATION RATES:

	Actual:	Real:
Avoided Energy Cost (Ea):	0.00%	-4.94%
Avoided Capacity Cost (Ec):	0.00%	-4.94%
Avoided Thermal Energy (Et):	0.00%	-4.94%
Operating & Maintenance (Eo):	6.25%	1.00%
Consumables (Eg):	0.00%	-4.94%
Fuel (Ef):	7.83%	2.50%
Capital Construction (Ec):	5.20%	0.00%

TECHNOLOGY:	WIND
HIGH/LOW CASE:	INCLUDES MAJOR EQUIPMENT REPLACEMENT FOR 30 YEAR LIFE
PEAKING/BASELOAD:	
PLANT CAPACITY:	25 MW WIND FARM
END USER:	UTILITY

COST OF ENERGY FROM ETSR TECHNOLOGY:

	1987 $: Cents/kWh	1987 $: $/kW-Yr	1995 $: Cents/kWh	1995 $: $/kW-Yr
Capital:	9.9	216.9	14.9	325.4
O&M:	2.4	53.5	3.7	80.3
Cons:	0.0	0.0	0.0	0.0
Fuel:	0.0	0.0	0.0	0.0
TOTAL:	12.3	270.5	18.5	405.7

PLANT CAPITAL COST:

Capital Cost ($/kW peak):	(Incl.AFUDC & O.Cst)		1487 (Base Yr)		2231 (Oper.Yr)		
Year Prior to Year(co):	-5	-4	-3	-2	-1	0	
Cash Flows (%):	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	
Interest During Construction:			10.98%	5.49%(Real)			
Escalation of Capital Cost Prior to Operation:			5.20%	0.00%(Real)			
Owner's Costs:			0.00%				
Resale/Salvage Value (% Cap. Cost):			0.00%				

PLANT OPERATION PARAMETERS:

Year Commercial Operation:	1995	
Plant Capacity Factor (CF):	25%	2190 Hrs
Plant Life (Years):	30	

OPERATING PARAMETERS (Base Year $):

Operating & Maintenance Costs (O&M):		
Fixed ($/kW-Yr):	(Base Year)	
Variable (Mills/kWh):	12.00 (Base Year)	
Consumables Cost ($B/Lb):		
Consumables Rate (Lb/kWh):		
Fuel Costs (F) ($/MBtu):	(Base Year)	
Heat Rate (HR) (Btu/kWh):		
Thermal Energy Rate (MBtu/kWh):		
Solar Fraction:	0.00%	0 Hrs

ECONOMIC PARAMETERS:

Base Year (Dollars):	1987
Inflation Rate:	5.20%
Investment Period (Years):	30

FLAGS:

	FOR:
Exclude (1) vs. Include (0) Interest Tax Shelter:	1 Cost of Capital
Normalized (1) vs. Flow Through (0):	1 Accounting

FINANCIAL PARAMETERS (After Income Tax):

COST OF CAPITAL (DISCOUNT FACTOR)

Cost of Common Equity (ke):	12.740%	7.17%(real)
Cost of Preferred Stock (kp):	9.290%	3.89%(real)
Cost of Debt Financing (kd):	9.290%	3.89%(real)
Percent Common Equity (C/V):	49.00%	
Percent Preferred Stock (P/V):	6.00%	
Percent Debt Financing (D/V):	45.00%	
Cost of Capital:	10.98%	5.49%(real)

DEBT COVERAGE:

Coverage Ratio:	CR =	3.72

FIXED CHARGE RATE:

FCR	0.146	0.089 (real)

TAX PARAMETERS:

Marginal Federal Income Tax Rate (T):	34.00%
Marginal State Income Tax Rate (t):	9.30%
Effective Marginal Income Tax Rate (T'):	40.14%
State Sales Tax Rate (ts):	6.00%(effective)
Other Taxes (Property) (to):	1.14%
Federal Investment Tax Credit (ITC):	0.00%
Federal Energy Tax Credit (FETC):	0.00%
State Energy Tax Credit (SETC):	0.00%

DEPRECIATION:

Federal:	MACRS-DB	15 Yrs
	SL	Yrs
	Base	100.00%
State:	SYD	28 Yrs
	SL	Yrs
	Base	100.00%
Capital Depreciation Base:		95.00%
In-service month (1..12):		6

PLANT CAPITAL COST ($/kW):

	1987 $:	1995 $:
Overnight Construction Cost:	1403	2231
Total Plant Cost:	1487	

ESCALATION RATES:

	Actual:	Real:
Avoided Energy Cost (Ea):	0.00%	-4.94%
Avoided Capacity Cost (Ec):	0.00%	-4.94%
Avoided Thermal Energy (Et):	0.00%	-4.94%
Operating & Maintenance (Eo):	6.25%	1.00%
Consumables (Eg):	0.00%	-4.94%
Fuel (Ef):	5.20%	0.00%
Capital Construction (Ec):	5.20%	0.00%

TECHNOLOGY: PHOTOVOLTAICS--CONCENTRATING SYSTEM
HIGH/LOW CASE:
PEAKING/BASELOAD:
PLANT CAPACITY: 10 MW MODULES
END USER: UTILITY

COST OF ENERGY FROM ETSR TECHNOLOGY:

	1987 $: Cents/kWh	1987 $: $/kW-Yr	1995 $: Cents/kWh	1995 $: $/kW-Yr
Capital:	12.5	327.5	18.7	491.2
O&M:	0.8	20.4	1.2	30.6
Cons:	0.0	0.0	0.0	0.0
Fuel:	0.0	0.0	0.0	0.0
TOTAL:	13.2	347.8	19.9	521.8

PLANT CAPITAL COST:

Capital Cost ($/kW peak): (Incl.AFUDC & O.Cst)			2250 (Base Yr)		3376 (Oper.Yr)	
Year Prior to Year(co):	-5	-4	-3	-2	-1	0
Cash Flows (%):	0.0%	0.0%	0.0%	0.0%	20.0%	80.0%

Interest During Construction: 10.98% 5.49%(Real)
Escalation of Capital Cost Prior to Operation: 5.20% 0.00%(Real)
Owner's Costs: 0.00%
Resale/Salvage Value (% Cap. Cost): 0.00%

PLANT OPERATION PARAMETERS:
Year Commercial Operation: 1995
Plant Capacity Factor (CF): 30% 2628 Hrs
Plant Life (Years): 30

OPERATING PARAMETERS (Base Year $):
Operating & Maintenance Costs (O&M):
Fixed ($/kW-Yr): 10.00 (Base Year)
Variable (Mills/kWh): 0.00 (Base Year)

Consumables Cost ($B/Lb):
Consumables Rate (Lb/kWh):
Fuel Costs (F) ($/MBtu): 2.70 (Base Year)
Heat Rate (HR) (Btu/kWh):
Thermal Energy Rate (MBtu/kWh):
Solar Fraction: 0.00% 0 Hrs

ECONOMIC PARAMETERS:
Base Year (Dollars): 1987
Inflation Rate: 5.20%
Investment Period (Years): 30

FLAGS: FOR:
Exclude (1) vs. Include (0) Interest Tax Shelter: 1 Cost of Capital
Normalized (1) vs. Flow Through (0): 1 Accounting

FINANCIAL PARAMETERS (After Income Tax):

COST OF CAPITAL (DISCOUNT FACTOR)

Cost of Common Equity (ke):	12.740%	7.17%(real)
Cost of Preferred Stock (kp):	9.290%	3.89%(real)
Cost of Debt Financing (kd):	9.290%	3.89%(real)
Percent Common Equity (C/V):	49.00%	
Percent Preferred Stock (P/V):	6.00%	
Percent Debt Financing (D/V):	45.00%	
Cost of Capital:	10.98%	5.49%(real)

DEBT COVERAGE:
Coverage Ratio: CR = 3.72

FIXED CHARGE RATE:
FCR 0.146 0.089 (real)

TAX PARAMETERS:

Marginal Federal Income Tax Rate (T):	34.00%
Marginal State Income Tax Rate (t):	9.30%
Effective Marginal Income Tax Rate (T'):	40.14%
State Sales Tax Rate (ts):	6.00%(effective)
Other Taxes (Property) (to):	1.14%
Federal Investment Tax Credit (ITC):	0.00%
Federal Energy Tax Credit (FETC):	0.00%
State Energy Tax Credit (SETC):	0.00%

DEPRECIATION:

Federal:	MACRS-DB		15 Yrs
	SL		Yrs
	Base		100.00%
State:	SYD		28 Yrs
	SL		Yrs
	Base		100.00%

Capital Depreciation Base: 96.00%
In-service month (1..12): 6

PLANT CAPITAL COST ($/kW):

	1987 $:	1995 $:
Overnight Construction Cost:	2100	3376
Total Plant Cost:	2250	

ESCALATION RATES:

	Actual:	Real:
Avoided Energy Cost (Ea):	0.00%	-4.94%
Avoided Capacity Cost (Ec):	0.00%	-4.94%
Avoided Thermal Energy (Et):	0.00%	-4.94%
Operating & Maintenance (Eo):	6.25%	1.00%
Consumables (Eg):	0.00%	-4.94%
Fuel (Ef):	7.83%	2.50%
Capital Construction (Ec):	5.20%	0.00%

TECHNOLOGY:	PHOTOVOLTAICS--FLAT PLATE
HIGH/LOW CASE:	
PEAKING/BASELOAD:	
PLANT CAPACITY:	5 MW MODULES
END USER:	UTILITY

COST OF ENERGY FROM ETSR TECHNOLOGY:

	1987 $: Cents/kWh	1987 $: $/kW-Yr	1995 $: Cents/kWh	1995 $: $/kW-Yr
Capital:	15.0	460.0	22.5	690.1
O&M:	0.9	28.1	1.4	42.2
Cons:	0.0	0.0	0.0	0.0
Fuel:	0.0	0.0	0.0	0.0
TOTAL:	15.9	488.1	23.9	732.2

PLANT CAPITAL COST:

Capital Cost ($/kW peak):	(Incl.AFUDC & O.Cst)		3161 (Base Yr)		4742 (Oper.Yr)	
Year Prior to Year(co):	-5	-4	-3	-2	-1	0
Cash Flows (%):	0.0%	0.0%	0.0%	0.0%	20.0%	80.0%

Interest During Construction: 10.98% 5.49%(Real)
Escalation of Capital Cost Prior to Operation: 5.20% 0.00%(Real)
Owner's Costs: 0.00%
Resale/Salvage Value (% Cap. Cost): 0.00%

PLANT OPERATION PARAMETERS:
Year Commercial Operation: 1995
Plant Capacity Factor (CF): 35% 3066 Hrs
Plant Life (Years): 30

OPERATING PARAMETERS (Base Year $):
Operating & Maintenance Costs (O&M):
Fixed ($/kW-Yr): 13.80 (Base Year)
Variable (Mills/kWh): 0.00 (Base Year)

Consumables Cost ($B/Lb):
Consumables Rate (Lb/kWh):
Fuel Costs (F) ($/MBtu): 2.70 (Base Year)
Heat Rate (HR) (Btu/kWh):
Thermal Energy Rate (MBtu/kWh):
Solar Fraction: 0.00% 0 Hrs

ECONOMIC PARAMETERS:
Base Year (Dollars): 1987
Inflation Rate: 5.20%
Investment Period (Years): 30

FLAGS: FOR:
Exclude (1) vs. Include (0) Interest Tax Shelter: 1 Cost of Capital
Normalized (1) vs. Flow Through (0): 1 Accounting

FINANCIAL PARAMETERS (After Income Tax):

COST OF CAPITAL (DISCOUNT FACTOR)

Cost of Common Equity (ke):	12.740%	7.17%(real)
Cost of Preferred Stock (kp):	9.290%	3.89%(real)
Cost of Debt Financing (kd):	9.290%	3.89%(real)
Percent Common Equity (C/V):	49.00%	
Percent Preferred Stock (P/V):	6.00%	
Percent Debt Financing (D/V):	45.00%	
Cost of Capital:	10.98%	5.49%(real)

DEBT COVERAGE:
Coverage Ratio: CR = 3.72

FIXED CHARGE RATE:
FCR 0.166 0.089 (real)

TAX PARAMETERS:
Marginal Federal Income Tax Rate (T): 34.00%
Marginal State Income Tax Rate (t): 9.30%
Effective Marginal Income Tax Rate (T'): 40.14%
State Sales Tax Rate (ts): 6.00%(effective)
Other Taxes (Property) (to): 1.14%
Federal Investment Tax Credit (ITC): 0.00%
Federal Energy Tax Credit (FETC): 0.00%
State Energy Tax Credit (SETC): 0.00%

DEPRECIATION:

Federal:	MACRS-DB	15 Yrs	
	SL	Yrs	
	Base	100.00%	
State:	SYD	25 Yrs	
	SL	Yrs	
	Base	100.00%	

Capital Depreciation Base: 96.00%
In-service month (1..12): 6

PLANT CAPITAL COST ($/kW):

	1987 $:	1995 $:
Overnight Construction Cost:	2950	4742
Total Plant Cost:	3161	

ESCALATION RATES:

	Actual:	Real:
Avoided Energy Cost (Ea):	0.00%	-4.94%
Avoided Capacity Cost (Ec):	0.00%	-4.94%
Avoided Thermal Energy (Et):	0.00%	-4.94%
Operating & Maintenance (Eo):	6.25%	1.00%
Consumables (Eg):	0.00%	-4.94%
Fuel (Ef):	7.83%	2.50%
Capital Construction (Ec):	5.20%	0.00%

TECHNOLOGY: 6.1 GEOTHERMAL DRY STEAM (STEAM COST UNDER "CONSUMABLES")
HIGH/LOW CASE: HIGH
PEAKING/BASELOAD: BASE LOAD
PLANT CAPACITY: 140 MW
END USER: UTILITY

LEVELIZED COST OF ENERGY FROM ETSR TECHNOLOGY:

	1985 $: Cents/kWh	1985 $: $/kW-Yr	1992 $: Cents/kWh	1992 $: $/kW-Yr
Capital:	4.2	257.6	5.8	357.7
O&M:	1.1	69.9	1.6	97.1
Cons:	6.0	369.7	8.4	513.3
Fuel:	0.0	0.0	0.0	0.0
TOTAL:	11.4	697.2	15.8	968.0

PLANT CAPITAL COST:
Capital Cost ($/kW peak): (Incl.AFUDC & O.Cst) 1797 (Base Yr) 2495 (Oper.Yr)

Year Prior to Year(co):	-5	-4	-3	-2	-1	0
Cash Flows (%):	0%	0%	0%	40%	40%	20%

Interest During Construction: 10.56% 5.50%(Real)
Escalation of Capital Cost Prior to Operation: 5.85% 1.00%(Real)
Owner's Costs: 0.00%
Resale/Salvage Value (%Cap.Cost): 0.00%

PLANT OPERATION PARAMETERS:
Year Commercial Operation: 1992
Plant Capacity Factor (CF): 70% 6132 Hrs
Plant Life (Years): 30

OPERATING PARAMETERS (Base Year $):
Operating&Maintenance Costs (O&M):
Fixed ($/kW-Yr): 14.56 (Base Year)
Variable (Mills/kWh): 3.31 (Base Year)

Consumables Cost ($/Lb): 0.017
Consumables Rate (Lb/kWh): 1.00
Fuel Costs (F) ($/MBtu): (Base Year)
Heat Rate (HR) (Btu/kWh):
Thermal Energy Rate (MBtu/kWh):
Solar Fraction: 0.00% 0 Hrs

OTHER COSTS:
Insurance Rate (b): 0.00%
Financing Cost (% of Capital Investment): 0.00%
Management Fees (% of Gross Operating Income): 0.00%

ECONOMIC PARAMETERS:
Base Year (Dollars): 1985
Inflation Rate: 4.80%
Investment Period (Years): 30

RUN DATE: 17 Sep 88

FLAGS:
Before-tax (1) vs. After-tax (0): 1 Cost of Capital
Normalized (1) vs. Flow Through (0): 1 Accounting

FINANCIAL PARAMETERS:

COST OF CAPITAL (DISCOUNT FACTOR)

Cost of Common Equity (ke):	12.31%	7.17%(real)
Cost of Preferred Stock (kp):	8.88%	3.89%(real)
Cost of Debt Financing (kd):	8.88%	3.89%(real)
Percent Common Equity (C/V):	49.00%	
Percent Preferred Stock (P/V):	6.00%	
Percent Debt Financing (D/V):	45.00%	
Cost of Capital:	10.56%	5.50%(real)

DEBT COVERAGE:
Coverage Ratio: CR = 3.81

FIXED CHARGE RATE:
FCR 0.14% 0.09% (real)

TAX PARAMETERS:
Marginal Federal Income Tax Rate (T): 34.00%
Marginal State Income Tax Rate (t): 7.30%
Effective Marginal Income Tax Rate (T'): 40.18%
State Sales Tax Rate (ts): 6.00%(effective)
Other Taxes (Property) (to): 1.00%
Federal Investment Tax Credit (ITC): 0.00%
Federal Energy Tax Credit (FETC): 0.00%
State Energy Tax Credit (SETC): 0.00%

DEPRECIATION:

Federal:	MACRS-DB	15 Yrs
	SL	Yrs
	Base	100.00%
State:	SYD	Yrs
	SL	20 Yrs
	Base	100.00%

Capital Depreciation Base: 95.00%
In-service month (1..12): 6

PLANT CAPITAL COST ($/kW):	Base Year:	Operating Year:
Overnight Construction Cost:	1500	
Total Plant Cost:	1797	2495

ESCALATION RATES:

	Actual:	Real:
Avoided Energy Cost (Ea):	0.00%	-4.58%
Avoided Capacity Cost (Ec):	0.00%	-4.58%
Avoided Thermal Energy (Et):	0.00%	-4.58%
Operating & Maintenance (Eo):	6.00%	1.15%
Consumables (Eg):	9.00%	4.01%
Fuel (Ef):	0.00%	-4.58%
Capital Construction (Ec):	5.85%	1.00%

file

SUSUMU ONO
3341 Ala Lilia Street
Honolulu, Hawaii 96818

February 2, 1990

Mr. Randall Hayes, Director
Rainforest Action Network
301 Broadway, Suite A
San Francisco, California 94133

Dear Mr. Hayes:

Thank you for sending me copies of your study titled "Energy Efficiency and Least - Cost Planning." I have distributed these copies to interested individuals and agencies. The Department of Business and Economic Development will respond on the substance of the report.

Please correct your mailing file regarding my address and title.

Again, I appreciate very much your sharing the results of your study.

Very truly yours,

Susumu Ono
Consultant

RAINFOREST ACTION NETWORK

January 12, 1990

Governor John Waihe'e
State Capitol
Honolulu, HI 96813

Dear Governor Waihe'e,

Enclosed is a slightly revised version of our energy study. Conversations with Princeton University regarding efficiency improvements in sugar cane cogeneration required reducing our estimates of these costs. These changes are reflected in Table 2 on page 9, as well as on pages 5 and 6 of our study. I have sent revised copies to Mr. Kaya and to Mr. Ono. We look forward to your response.

Sincerely,

Randall Hayes

Randall Hayes
Director

Enclosures

TO: Director, DPED
☐ PLEASE COORDINATE with _____

FOR:
___ Comment/Recommendation (required)
✓ Appropriate attention
___ Direct reply (cc/bcc: Governor)
___ Your information/file
___ Draft reply for Governor's signature
___ Follow up/report
___ Submit copy of response (if any)
___ Keep enclosure(s)
___ Return enclosure(s)
___ Other

DUE seven working days from JAN 11 1990
(If delay is encountered in meeting suspense date, please advise by telephone immediately)
In reply, please refer to: 90:032-19

301 BROADWAY, SUITE A, SAN FRANCISCO, CA 94133 (415) 398 4404 FAX 415 • 398 2732

[ ] PLEASE COORDINATE with DLNR
DOH

FOR:

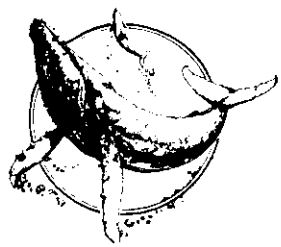
___ Comment/Recommendation (required)
___ Appropriate attention
___ Direct reply (cc/bcc: Governor)
___ Your information/file
✓ Draft reply for Governor's signature
___ Follow up/report
___ Submit copy of response (if any)
___ Keep enclosure(s)
___ Return enclosure(s)
___ Other
xJA, GOV OF SO

DUE seven working days from DEC 15 1989
(If delay is encountered in meeting suspense date, please advise by telephone immediately)
In reply, please refer to: 89:781-20

Sea Shepherd Conservation Society

Hawaii: **P.O. Box 2147**
Kihei, Maui 96753
Tel: (808) 878-6906

Mainland: P.O. Box 7000-S
Redondo Beach, CA 90277
Tel: (213) 373-6979



Paul J. von Hartmann
Director
Sea Shepherd Hawaii

9 December 1989

FOR IMMEDIATE RELEASE

An Open Letter To Governor John Waihee:

You have repeatedly stated that geothermal energy developement will "reduce Hawaii's dependence on oil".

Nothing could be further from the truth, governor! It is a lie of incalculable proportion, that the people of this state do not believe any more.

After weeks of statewide protest, you finally condescended to a two-and-a-half-hour meeting with **five** people, from two islands. The local news report of the closed meeting stated that your position remained unchanged, a complete stonewall, briefly mentioned on page three of the Maui News. On page **one** the same day, you, Bill Paty, Michael Buck, and Alan Marmelstein were on Maui to dedicate some buildings at a bird sanctuary! There was even a large photo printed of this 'major event.'

You insult the intelligence of many, with your high-visibility posturing, orchestrated to convince us of your environmental and cultural sincerety. At the same time, you ignore the outraged demands of the informed public. I personally received assurance from Mr. Paty, in my meeting with him last month, that he would be willing to come to Maui to answer our questions. Why was no effort made, as long as you were all here, to meet with S.A.G.E. representatives? How can a public servant justify such blatant disregard for public concern?

Obviously, you intend to ram geothermal down our throats, no matter what we say or do. By encouraging the industrial gang rape of the Hawaiian Islands, you contribute heavily to the desecration of a liveable global environment, as well.

I formally invite you to prove me wrong, Governor Waihee.
I challenge you to a televised [illegible]

OPEN LETTER TO GOVERNOR JOHN WAIHEE, 9 December 1989
(Continued)

a time when the global environment is on the brink of multiple catastropies, then I submit that you are not fit to govern this state. If you continue to be under-responsive and covert in your dialogue with the citizens groups who have volunteered their time and energies to a sane assessment of geothermal energy, then it is my feeling that you ought to step aside, before you are voted out of office in the coming year.

I request that an open, written response to this letter, containing allegations of a most serious nature, be publicly printed statewide, as that will be the distribution of my statement to you.

With Conviction,

Paul J. von Hartmann

Director, Sea Shepherd Hawaii
S.A.G.E. volunteer
Resident of Maui

cc/ The Kama'aina News
The Maui News
South Maui Times
Honolulu Advertiser
Pele Defense Fund
Rainforest Action Coalition
The Sea Shepherd Conservation Society
ECONET

att/ Maui News articles, Friday December 8, 1989.
Birds' haven blessed, pp.1A
Gov. Waihee meets protesters, pp.3A ← 2nd attachment not received.
sf

The Maui News / TOM STEVENS photo

Gov. John Waihee and scientist Fern Duvall joined Hawaiian ceremonial leader Sam Kaai during the ceremony to mark $4 million in improvements to the state's Olinda endangered bird facility. The facility's goal is to breed and raise nene geese, koloa ducks, Hawaiian crows and other vanishing native bird species.

Birds' haven blessed

There's even sign of hope for alala

By TOM STEVENS
Staff Writer

OLINDA — Gov. John Waihee dedicated several new structures at the state's endangered bird facility at Olinda yesterday and renewed his commitment to protecting Hawaii's vanishing native bird species.

"This is an opportunity to do something special for the future generations," Waihee said in dedicating the $4 million Olinda facility, which replaces the state's 40-year-old Pahakuloa endangered species facility on Hawaii.

The governor and a large retinue of state officials from Honolulu, Maui and Hawaii toured three new breeding enclosures for nene geese and koloa ducks. He also helped plant a tree to underscore the state's long-term commitment to the endangered bird project.

"We are with you, and we remain committed to making sure this mission is a success," he said, alluding to the Olinda facility's purpose of rearing enough endangered nene geese, koloa and laysan ducks and Hawaiian crows (alala) to rebuild vanishing wild populations.

Hawaiian ceremonial leader Sam Kaai of Pukalani blessed each of the three enclosures in the Hawaiian language, Olinda scientist-in-charge Fern Duvall repeated the blessings in English, and the two then joined the governor in untying twined ferns to symbolically open the structures, which sit on the site of the old Olinda honor camp.

Also taking part in yesterday's activities were state Department of Land & Natural Resources Director Bill Paty, administrator Michael Buck of the department's Forestry and Wildlife Division, DLNR staff biologist Ron Walker, and Allan Marmelstein, Pacific Islands administrator for the U.S. Fish and Wildlife Service.

While they and three dozen other government officials did not tour the four large alala enclosures at Olinda in deference to the crows' sensitivity to disruption, the fate of Hawaii's

See HAVEN, page A4

OFFICE OF THE GOVERNOR **ROUTE SLIP**

Administrative Director 12/18/89

FROM: Joshua Agsalud

TO: Roger Ulveling — Bill Paty

John Lewin — Warren Price

Gus Ono — Gerald DeMello

Chuck Freedman

- ☐ Appropriate action
- ☐ Comments & recommendations
- ☐ Approval
- ☐ Signature
- ☐ See me
- ☐ Information & return
- ☐ Information & retain
- ☐ Direct reply, copy to me
- ☐ Draft reply for my signature
- ☐ Route per list
- ☐ Return

COMMENTS

This letter is being sent to the general public here and on the mainland.

P.O. Box M
Haiku, Maui, Hawaii 96708

Dear Friends

In the past few years many of us have been confronted with the knowledge of the continuing destruction of the earth's rain forests, and have been made to realize some of the irreversible consequences of that rapidly expanding loss. Many of us have felt helplessness and frustration, as at the daily news of some appalling war that we could do little to stop, since the trees were falling in countries where we had no vote, no voice. But few, in any state, are currently aware that there is a tropical lowland rain forest within what is now politically the United States, and that it is presently in danger of disappearing even more rapidly than the forests of South America and southeast Asia. It is on the Big Island of Hawaii, and it is being smashed open and ground under by earth-moving machinery as you read these words.

The name of the forest is the Wao Kele O Puna. It begins a few miles above the old one-street town of Pahoa, and when the bull-dozers moved in on it, in the autumn of 1989, it was no longer very large - some 27,000 acres. But it is the largest intact bit of lowland rain forest remaining in the Hawaiian islands, and it is unique. A few imported species have established themselves in it, around the edges, but for the most part the flora - much of it still unexplored - is composed entirely of native species evolved in the Hawaiian islands, in the process that makes these islands, from the biologists' point of view, one of the most remarkable sources on the planet. The Wao Kele O Puna, besides, is the only place in the islands where native birds, wiped out everywhere else in the lowlands, have managed to survive and to develop immunity to the avian malaria that arrived with Europeans and the mosquito.

The Wao Kele O Puna is part of the "ceded lands", legally dedicated to the use of the Hawaiian people. It was recently "swapped" for an adjoining bit of disturbed and non-native forest, by the State of Hawaii, a move that was made without asking the consent of native Hawaiians, and was undertaken specifically to allow the invasion that will destroy the forest. The Wao Kele O Puna has supplied traditional practitioners of the Hawaiian healing arts with medicinal plants since long before European contact, and it has been culturally important to native Hawaiians in a variety of other ways. If the land-swap - now disputed in the courts - is finally declared legal, the Hawaiians will no longer have access to it for any purpose. But that will not matter, for the forest itself will soon cease to exist.

We have become familiar with the schemes, the gross rapacity that continues to turn the rain forests of South America, Indonesia, and southeast Asia into smoking wastes and desert. In Hawaii the corresponding plan is geothermal development. A small experimental geothermal well was drilled outside Pahoa in the ea[illegible]. The noise was indescribable. The toxic gases the plant released destroyed all vegetation for some distance around it, turning what had been forest into what looks like a chemical dump. They were so bad, indeed, that the operation had to be closed down in 1989, and residents evacuated from the area - even those who had managed to survive in the neighborhood up until then. That was a small indication of what was in store. The present plan is to dig a series of some twenty geothermal wells inside the rain forest itself. All together they would amount to several hundred times the size and output of the original experiment. ⑥ The [illegible] was not designed to last as long as it did

There has been opposition within the islands, from native Hawaiians and other residents, and much testimony has been given against geothermal development here (not all volcanoes are alike, despite official reassurances on the subject) but opposition and testimony were ignored and the developers moved ahead with the encouragement of Senator Inouye, State Governor Waihee and other [illegible] figures. The official endorsement of geothermal development in Hawaii says that it would be a major move to [illegible] Hawaii independent of imported fossil fuels, and there is the constant alluring suggestion that it would lower the cost of electricity in the Islands. Neither is true. The additional energy [illegible] were ever produced in dependable quantities, would [illegible], be the signal for a further spate of building and tourist overdevelopment. And it is hardly likely to be mere coincidence that another scheme, to strip-mine the Pacific floor near Hawaii, for manganese, would require a considerable concentration of electricity if the ore were to be refined in the islands. Official policy is fervent in its insistence that the designs of the military have nothing to do with any of this.

The present plan is not, of course, confined to the rain forest, which it would simply destroy. The energy from the wells would be transported on 100' towers, to the sea, and in oil-filled conduits, at depths of up to 6,000', under the sea to Maui. Then on towers again, across Maui to the sea, and undersea to Waimanalo on Oahu. The oil-filled conduits have never been tested at such depths. The sea-bottom shifts. An oil leak would [illegible] an oil spill from below. And a leak, critics assure us in a way that is also familiar by now, is only a matter of time. silicon insulated cable - this sound as if it's Alaska Crude Maybe they think Capt. Hazlewood will throw the switch too -

The suggestion that geothermal energy would reduce electricity prices is deliberately misleading. The price structure for electricity in Hawaii is not regulated by anything so simple and overt as supply and demand, for one thing. For another, it is the opinion of many observers not involved in the geothermal boondoggle that the vastly expensive scheme will never

I don't think this has been demonstrated

begin to pay off the billions it will cost. The Hawaiian Electric consumers, and no doubt the taxpayers of the State of Hawaii and perhaps of other states, will be left to foot the bill. An in the meantime the forest will have gone.

Relatively few people anywhere are aware that the destruction is going on. The local papers in Hawaii - on the Island of Hawaii, on Maui, and in Honolulu - have done little more than refer to it, but that is not surprising. Other attempts to destroy the forests for short-term profit - for logging the tree ferns, for turning the trees into wood chips to burn as "alternate energy" to make electricity in Hawaii and Japan - received grudging, limited coverage or none at all in the local press, and the word had to be spread in other ways. Totally Fails

I am writing this in late October 1989. A few weeks ago the first earth-moving machines began the first gouge into the forest. They had a permit, of questionable legality, to bulldoze a few acres to begin a road. They proceeded to destroy more than twice the area designated to them, razing a swath three miles long straight into the forest - no curves, because of the length of the drilling rig they planned to bring in shortly. When their trespass was brought to the notice of the authorities they were given a token fine. The great 'ohia trees were smashed, cut up, and buried in crushed lava. The 'ie'ie vines which refuse to grow anywhere but in the forest - not in greenhouses nor botanical gardens nor propagating nurseries - withered and yellowed in the sun. The run-off rivulets were interrupted, filled with mud and weed seeds from the huge tires. Every mile or less a chemical toilet was installed beside the graphite-colored surface, and the forest began to smell accordingly. At the end of the road an area the size of a parking lot at a big shopping center was razed, crushed, and dug out to make a basin that was then lined with black waterproof material, a vast black hollow unmade bed, left to fill with water. The birds were still singing around it. On October 7 a group of several hundred protesters from all the main islands, led by native Hawaiians of all ages, carrying offerings, walked to the new iron gate. Police cars. Hired guards: The Hawaii Protective Association. A lawyer from a company named True Venture, operating out of Casper, Wyoming, told the Hawaiians that they would not be allowed to pass. They said the land was theirs. They were then told that they would not be prevented from proceeding but would do so at their own risk. The ironies of the exchange seemed to pass unnoticed, and the procession continued, past the guards, for three miles to the black-lined basin and the array of earth-moving machinery beyond it. One ancient 'ohia tree, on its own mound, had somehow been spared. Walking barefoot on the cinders, led by their chanters, the native Hawaiians one by one climbed past the machines and laid their offerings to the fire-goddess at the foot of this remnant of their place and their relation to it, and then turned and walked the three miles back to the gate, and out again.

The damage is already appalling and much more is planned. The developers are currently trucking water in to fill the basin so that they can begin drilling before any injunction or legal control can delay them. They are counting - as innumerable destructive schemes in the history of Hawaii have counted - on people not knowing what they are up to until it is too late to prevent it.

I am writing this to ask you to do something to prevent it. Not to send a check (though that would help) but to make your concern known and to spread the story to others. If you are a writer, to write about it, to local papers, to Hawaiian officials, to publications that will print what you say, what you ask. To William Reilly, Senator Inouye, Hawaii State Governor John Waihee. If you are a teacher, to bring the story to the attention of your students and get them to write. If you are thinking of coming to Hawaii, to consider participating in demonstrations and vigils to call attention to what is happening. The accompanying fact sheet gives addresses of people to write to for more information about how you can help. This is a rain forest that we can save if enough of us want to badly enough. But no amount of wanting, by any number, later on, will be able to bring it back.

W. S. Merwin

PELE DEFENSE FUND
PO Box 404
VOLCANO
HI 96785
808-935-1663

BIG ISLAND GEOTHERMAL PROJECT

The last lowland tropical rainforest in the United States, growing on the flanks of the highly active Kilauea volcano on the Big Island of Hawaii is about to be destroyed.

In the last few weeks, a road has been constructed and an area cleared to begin test drilling. Ultimately, several hundred shafts will be sunk more than a mile beneath the surface to generate steam for electricity.

This project must be stopped because:

1. It would destroy the last lowland tropical rainforest in the US. Lowland tropical is the most important rainforest type, because of species richness, diversity and rarity. Rainforests are the world's most important conservation priority because, if present rates of destruction aren't stopped, they will be eradicated by the turn of the century. If the US can't protect it's only lowland tropical rainforest, we might as well kiss the world goodbye.

2. The volcano and the rainforest are sacred places for the native Hawaiian people and the drilling itself is "a brutal violation of our religious beliefs" (Pele Defense Fund), desecrating the body of the Goddess Pele.

3. The company, Hawaii Electric Industries, is now able to "develop" the area as a result of a land exchange where this prime rainforest was stolen from the native Hawaiians in exchange for a bunch of lava rock and woodchipped forest. Part of the exchange included the agreement that no environmental impact study would be required.

4. The hydrogen sulfide which will be released by the several hundred proposed geothermal wells is highly poisonous - 50% more poisonous than hydrogen cyanide - and this will destroy both the biota and pose serious health risks for human beings. H2S is particularly dangerous because (though smelling of ~~farts at low concentrations~~) at high concentrations it destroys nasal receptors and is therefor odorless. Only a few years ago, half a dozen people were killed by this gas at the University in Minneapolis.

5. Brine from the wells will be released on the surface and, after killing the surface vegetation, will percolate down to contaminate the lense of fresh water which is the island's lifeblood.

6. The area where the wells are proposed is the most geologically active in the world. They are drilling into an ACTIVE volcano. There have been two earthquakes in the last few years centred very near to where the proposed wells are to be located. The company's previous choice of site (where their tame geostitute testified that there was minimal chance of geological disruption) was overun with lava before they could begin and is now covered with hundreds of feet of lava.

7. The energy will be used to bring new and polluting industries to the islands. In particular it will make it feasible to strip-mine the ocean floor for manganese and chrome which could then be smelted on the islands. Huge amounts of toxic wastes will be dumped in ocean trenches, presently among the states richest fishing grounds. The energy won't decrease the reliance on oil, it will merely fuel the industrialisation of the islands - a space port is on the cards as well as expanded resorts, cities and condo developments.

8. Ratepayers in Hawaii and taxpayers throughout the US will have to pay for this project which will cost from 2 to 4 billion dollars - guaranteeing electricity far more expensive than at present or which could be provided by alternatives energy sources.

9. Huge new electrical powerlines will crisscross the island. The proposed undersea cable to Maui and Oahu will require more than 1000 electrical towers nine stories high on the Big Island and will ensure the industrialisation and further growth of rampant tourism on these islands. This undersea cable will have to cross a treacherous, geologically unstable channel well over a mile deep, 7 times as deep as any cable has ever been laid. The public of course will have to pay. If this cable is built and then severed by earth movements, it could take months to repair, so that there will have to be a backup generating capacity of the same power (500 megawatts) in place.

10. Alternatives exist: conservation, solar, wind, biomass, waste heat recovery and other new techniques.

WHAT YOU CAN DO

Write to Hawaiian newspapers, Hawaii County mayor and your congressman and president protesting the destruction of the US's last tropical lowland rainforest:

Star Bulletin
PO Box 3080
Honolulu HI 96802

Honolulu Advertiser
PO Box 3110
Honolulu HI 96802

Bernard Akana,
mayor,
25 Apuni St
Hilo HI 95813

Hawaii Tribune Herald
PO Box 767
Hilo HI 96721

West Hawaii Today
Box 789 Kailua Kona
HI 96745

Senator D. Inouye
Hilo Lagoon Center
101 Aupuni St #205
Hilo Hawaii 96720

President Bush
The White House,
Washington D.C.

SEND DONATIONS to Rainforest Action Group
C- PO Box AB
Kutistown
HI 96760

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7430250 HIDPED FAX: (808) 523-8637

MEMORANDUM

TO: The Honorable William Paty
The Honorable Bruce Anderson
The Honorable Leslie S. Matsubara
Mr. Susumu Ono
Mr. Chuck Freedman
Mr. Douglas Carlson
Mr. Maurice H. Kaya
William F. Quinn, Esq.
Ms. Jill Center

FROM: Roger A. Ulveling

DATE: November 15, 1989

SUBJECT: The Rain Forest Action Network (RAN)

Enclosed please find a copy of the following for your information and records:

1. Honolulu Star-Bulletin article dated 11/13/89
2. Honolulu Advertiser article dated 11/14/89

Roger A. Ulveling

Roger A. Ulveling

Opponents say Puna plant will doom rainforest

11.13.89

Geothermal will destroy our last tropical rainforest

I am writing to protest the imminent destruction of this country's last tropical lowland rainforest that grows on the flanks of the Kilauea volcano on the Big Island of Hawaii.

The damage done to the balance of the island's ecosystem (a system which includes humans whose health will be at risk due to the exposure of high levels of hydrogen sulfide released by proposed wells) is reason enough to kill this project.

But, moreover, the development that ensues if the project proceeds, will make room for even more hideous industrialization and uncontrolled growth. Please, move to protect this sacred land! Consider alternative energy sources: conservation, solar, wind, biomass, or waste heat recovery.

Melissa A. Johnson
Blue Mountain Lake, N.Y.

We must save the rainforest in our own backyard

During "World Rainforest Week" (Oct. 23-29) Hawaii was visited by Australian rainforest conservationist, John Seed. Seed and fellow activists, supported by the majority of the Australian peoples, have fought for 10 years against forest plunderers.

Often they have won, procuring "World Heritage" status for several endangered forests of the Australian mainland and Tasmania. Realizing that "no forests are safe until all forests are saved," he went global with his efforts and message.

Seed provides us with an expanded perspective on what is happening in our own backyard, at the numerous planned geothermal sites in Wao Kele O Puna rainforest on the Big Island. "How can you expect to save forests so far away," he asks, "if you don't care to save the one you have here?"

In this case, development clearly will lead to destruction and more development, not to energy efficiency. Private foreign and domestic investors stand to make large profits. And the state will collect royalties on the steam it releases, as we begin to pay higher monthly utility bills. A forest and all its unique wildlife will be severely damaged, perhaps beyond repair, in the process.

Isn't this clearly a case of the interests of a few conflicting with the interests and the needs of the many? Or is "development at all costs" our chosen way of life?

We suggest, with Seed, that we all begin to "turn this thing around." We think that we all want to retain an inhabitable planet.

Robert Kai Irwin, Rajindra Puri
University of Hawaii-Manoa

Proponents of geothermal don't live in Puna district

I see that Richard Matsuura, a state senator who does not represent Puna district, is perfectly willing to sacrifice Puna's rainforest for geothermal development. He even has the audacity to call this decision "environmental," showing his lack of respect for the English language, as well as the people and resources of Puna.

Wao Kele O Puna is (was?) the last lowland tropical rainforest in the United States. The native species which had been placed under the protection of natural area reserve status are 90 percent endemic, meaning they occur nowhere else in the world.

One needs only the slightest environmental awareness to know that rainforests in general, and unique endangered species in particular, are highly valued by scientists worldwide. Hawaii especially has seen the loss of so much of its native heritage, yet even now our government seems blind to the urgency of the need for preservation.

Wao Kele O Puna was public land, wisely set aside for its irreplaceable biological and cultural value. Recently, without any public mandate, the state traded this reserve (27,000 acres) to Campbell Estates for a smaller parcel, which was already over half inundated by lava flows, with other parts under agricultural development. The reason for this trade was to provide Campbell with land suitable for geothermal development, their former plans having been thwarted by Pele.

This land swap was an back-room deal involving ceded public land. This is facing an unresolved legal challenge, and yet the bulldozers of True/Mid-Pacific are already destroying this last native forest.

Sen. Matsuura, Gov. Waihee, Department of Business and Economic Development, the health department, True/Mid-Pacific, and Ormat/P.G.V. all share one characteristic with every other geothermal proponent: That is, they do not live in Puna, where the development would take place.

They and their fellow conspirators are content to sacrifice Puna's resources, and close their ears to the objections of those who will be affected by it.

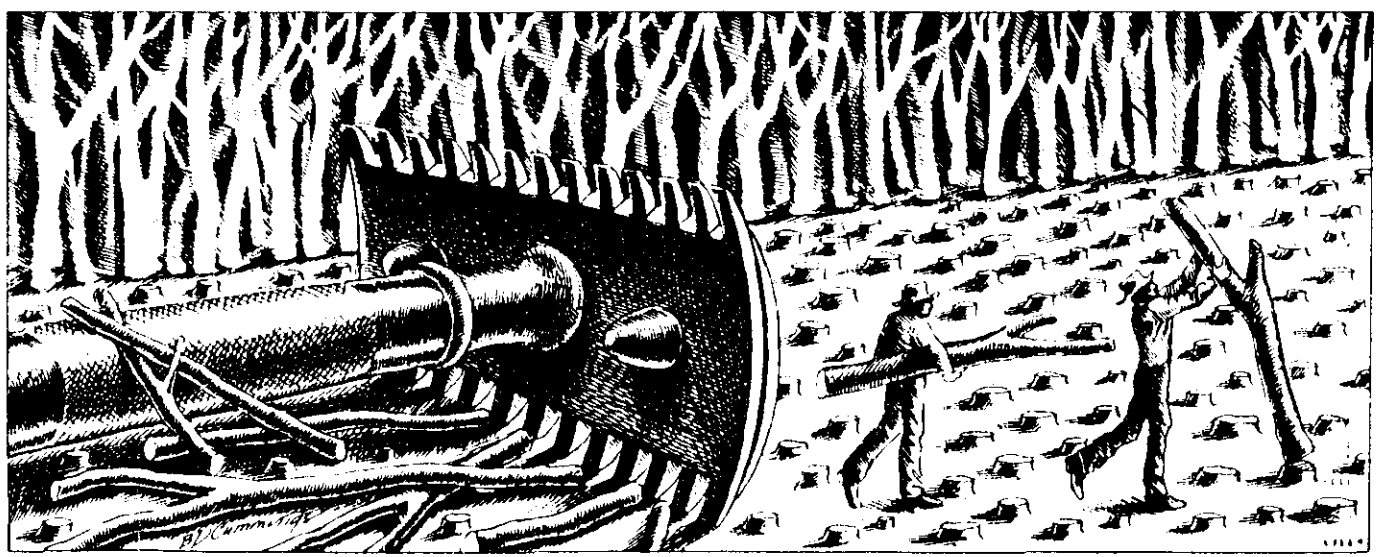
Gary Barnett
Pahoa, Hawaii

We must look to the ocean, not rainforest for energy

I understand the rainforest on the Big Island is being cut down to build a geothermal plant. I certainly agree there must be a better way to supply the islands with energy than burning tons of oil each year. Well, there is an alternative which would be cleaner and continuous and that is ocean thermal energy.

Before destroying any rainforest (what there is left), I think we should investigate the power that we could harness from the ocean.

Raymond Wilson



Barbara Cummings L.A. Times Syndicate

Group on Big Isle chants against geothermal trial

By Hugh Clark
Advertiser Big Island Bureau

11-14-89

HILO — More than 50 protesters, each holding onto a piece of long rope symbolizing the deep sea cable that is proposed to transmit geothermal power interisland, chanted and marched their way through three government buildings yesterday.

The latest in a series of related protests by native Hawaiian activists, the Rainforest Action Group and others opposed to geothermal was timed to coincide with the start of a 10-day trial of the deep sea cable between Maui and the Big Island.

Similar protests were scheduled on Oahu and on Maui.

The protesters spent nearly two hours marching and chanting as they snaked through the State and County Buildings en route to the Federal Building in downtown Hilo — marching the entire one-mile distance.

They retraced their steps for a final shouting chorus of "No Geothermal; We Want Rainforest." at the county and state offices in Kaiko'o.

The protests were free of incidents, though some county and state workers complained about the noise.

"Why can't they keep them outside instead of in the building?" asked a District Court clerk.

Bob Petricci of Leilani Estates, a leading critic of geothermal development, said the alliance of opponents hope to enlarge their support group and to shut down all future geothermal activity.

He said Mainland contributions have been coming in at an increasing rate. Last week's included a $1,300 donation from a Colorado women expressing concern about the loss of the Wao Kele O Puna forest where at 25-megawatt development is under way by True/Mid-Pacific Geothermal Venture on Campbell Estate land.

Critics say the project will destroy valuable rainforest while supporters say only small amount of the whole forest will be disturbed by the roads and drilling sites.

Meanwhile, 45 Big Islanders, most of them from Puna, filed requests for a hearing before the state Department of Health.

They want to argue against air pollution standards proposed for the pending Puna Geothermal Venture, a partnership of Hawaii Electric Industries of Honolulu and Ormat Energy Systems of Nevada.

The proposed rules received largely adverse testimony in a public hearing held in Hilo last week.

STATE OF HAWAII
DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

DATE 10/18/89

SUBJECT: Geothermal re Pele Defense Fund

DUE _____

TO: 1 Sus Ono 2 _____

FROM: **DIRECTOR'S OFFICE**

3 _____ 4 _____

FYI XX COMMENT _____ REPORT _____ ACTION _____ SIGNATURE _____

5 _____ 6 _____

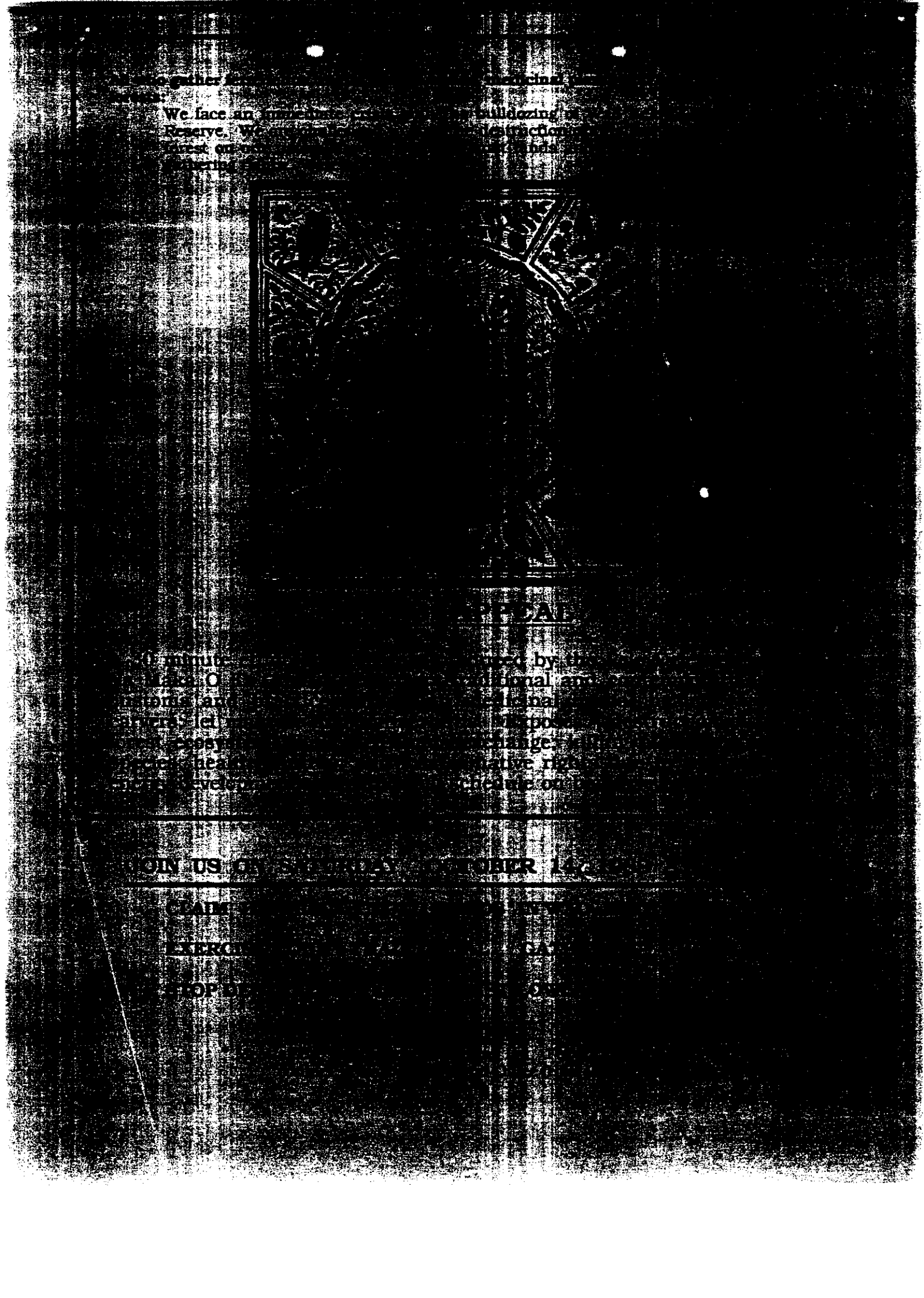
DRAFT _____ APPROVAL _____ RETURN _____ TYPE _____ CIRCULATE _____

7 _____ 8 _____

XEROX _____ COPIES FILE _____ APPROVED WITH CHANGES NOTED _____

MESSAGE OR COMMENTS:

file - Rainforest / Pele Defense Fund



SPECIAL SHOWINGS AND MEETINGS

Hawai'i
Saturday October 7 — UH Hilo Campus Center

Thursday October 12 — UH Hilo Campus Center — 7:00 pm

O'ahu
Sunday October 8 — Lili'uokalani Children's Center — 10:00am
* this special preview is scheduled right before the noon meeting of the pro-sovereignty groups. We will discuss the October 14 actions.

Tuesday October 10 — UH, Manoa, Kuykendall Auditorium
Parking is available behind Kennedy Theatre

Moloka'i
Tuesday October 10 — Ho'olehua Recreational Center — 7:00

Maui
Wednesday October 11 — Maui Community College Hale [illegible]

Kaua'i
Thursday October 12 — Anahola Hawaiian Homes Mauka Clubhouse — 7:00

Call Pele Defense Fund Hilo for more information.

SCHEDULED TELEVISION SHOWINGS:

Big Island
Hilo Spacelink Community Channel
Monday October 9 — 7:00 pm
Tuesday October 10 — 7:00 pm
Kona Sun Cablevision — October 9 - 13 (Please check local cable listings)

Maui
Chronicle Cablevision Channel 19
Monday, October 9 — 8:00 pm
Wednesday, October 11 — 8:00 pm
Friday, October 13 — 8:00 pm

O'ahu
Channel 20
Monday, October 9 — 5:30 pm
Wednesday, October 11 — 6:30 pm
Thursday, October 12 — 6:30 pm
Friday, October 13 — 5:30 pm
Thursday, October 19 — 6:30 pm
Thursday October 26 — 6:30 pm

Kaua'i
Community Channel
Monday October 9 through Friday, October 13
8:30 am, 11:00 am, 8:30 pm, 11:00 pm

THE PELE DEFENSE FUND
POST OFFICE BOX 404 • VOLCANO HAWAII 96785

October 3, 1989

Aloha mai:

On Sunday, September 24, 1989, a number of hui and 'ohana from the various islands gathered together on the Big Island and walked into the Wao Kele O Puna rainforest where a geothermal power plant will be built to generate 100 megawatts of electricity. We witnessed the destruction of a small portion of the 27,000 acres that make up this irreplaceable volcano rainforest. As you read this, bulldozers are grubbing and grading roads for drilling the first of 30 geothermal wells.

In this Hawaiian forest, 95 percent of the native plants cannot be found anywhere else in the world and most are already endangered. Our kupuna, Papa Henry Auwae tells us that this forest is the source of life and he pointed out numerous plants that are used for la'au lapa'au healing, such as 'ama'u, moa and pa'i niu. Kumu Hula Pualani Kanahele tells us that this forest is a source of fern, maile and liko lehua gathered by halau for weaving lei and making ceremonial adornment. Moreover, the process of gathering these plants is, itself, a ritual to place the dancers in contact with the 'aumakua and akua who are honored in the chants and hula - such as Hi'iaka, Laka, Kapo and Hopoe. Both affirm that the destruction of this forest would kill off an essential part of our traditions and life as Hawaiians as passed down to us by our kupunna about healing, hula and the Pele family of the volcano rainforest.

The road that they are grading is the puka for a huge drilling rig that was shipped over to Hilo on a whole barge from Texas. It will be trucked into the Wao Kele O Puna as early as the week of October 16 to start digging into Tutu Pele for geothermal energy. Those of us who went into the forest decided that we just cannot sit by and let it happen. That would let down our kupuna as well as our keiki and mo'opuna.

In addition, the Wao Kele O Puna lands are Crown and Kingdom lands that are part of the 1.4 million acre ceded public lands trust. In 1985, the Department of Land and Natural Resource (DLNR) gave this 27,000 acre volcano forest to Campbell Estate in exchange for 25,000 acres of their land at Kahauale'a. Aside from losing 2,000 acres in the swap, 15,000 acres of the Kahauale'a land is covered with freshly erupted lava, 1,200 acres are wood chipped and 5,600 acres are promised to the Volcano National Park. This leaves our public land trust with only 3,200 acres of forested land. This is unjust and we believe it is illegal.

The law states that tenants within an ahupua'a have the right to enter undeveloped land to gather materials needed for practicing native Hawaiian customs and traditions, such as firewood, house-timber, aho cord, thatch or ki leaf. Two years ago, Kaolelo Ulaleo, an ahupua'a tenant of Kalapana, and the Pele Defense Fund jointly filed a suit against the unjust exchange of the Hawaiian public trust lands for Campbell Estate lands. The Pele Defense Fund

accuses the state of negligence in not looking out for the interests of the native Hawaiians in the exchange. Ulaleo argues that he will no longer be able to gather in the forest of his ahupua'a or conduct religious and cultural ceremonies to his 'aumakua, as he has done since childhood with his kupuna.

The court has not even made a final decision on the Ulaleo/Pele Defense Fund claims against the DLNR and the geothermal developers are destroying the forest. They are also trying to close off public access to the forest. The hui and 'ohana who gathered together on Sunday believe that the Wao Kele O Puna is still part of the ceded public lands trust. We do not recognize Campbell Estate to be the owner of our forest.

We are writing to ask for your kokua. Pele Defense Fund and Na Maka O Ka 'Aina have produced a new video to highlight the concerns relating to Pele, the rainforest and geothermal energy. The enclosed flyer lists the times and dates that it will be aired on Community Channels on O'ahu, Maui, Kaua'i, Kona and Hilo. In addition, special meetings are being organized on the various islands to view the video and to discuss plans to organize direct action in the forest at Noon on Saturday October 14 to: (1) assert our native gathering rights; (2) make our claims to the ceded public lands; and (3) honor our akua and 'aumakua with ho'okupu..

We hope that you will attend one of the meetings (see flyer) and join us on October 14. We know that the time between now and October 14 is short, but time is running out for us since our court suit is not stopping the bulldozers and, as noted above, the drilling rig could go in by October 16. Direct political action is needed. If you cannot come in person, you could kokua by sending a donation to help bring people together for that weekend.

This is not just a Big Island issue. It is a Hawaiian issue. If they can take away our ceded lands and cut off access in Puna, then they will be able to do it on any island. The ceded public land trust is at the heart of our sovereign claims. We must protect it or we will have little to be sovereign over in the future. If you have any questions, mana'o or suggestions, please contact the Pele Defense Fund at 935-1663. Contributions can be sent to Pele Defense Fund / P.O. Box 404 / Volcano, Hawai'i 96785.

Mahalo,

Palikapu Dedman Noa Emmett Aluli

Pele Defense Fund

GATHER ON OCTOBER 14, 1989 AT NOON IN THE PAHOA SCHOOL PARKING LOT.: Rides for neighbor island supporters will be available. Call in your schedule to the Pele Defense Fund Office - 935-1663 (Hilo). We are arranging a place to camp on Friday and Saturday night so please bring your sleeping bag.

PELE DEFENSE FUND FACT SHEET

Geothermal energy plants are being proposed at Kapoho and at the Wao Kele O Puna Natural Area Forest Reserve. In Kapoho, the Lyman and Bishop Estates are making their lands available to Ormat, an Israeli energy company based in Nevada. They plan to build a 25 megawatt plant to supply electricity to Hawai'i island. The situation at Wao Kele O Puna is more complex.

CEDED LANDS SWAP

These lands are part of the Crown and Kingdom lands that were confiscated by the Provisional Government at the time of the 1893 overthrow and then ceded to the U.S. government at the time of Annexation in 1898. Transferred at statehood, they are known today as the ceded public lands trust, and managed by the State of Hawai'i's Department of Land and Natural Resources (DLNR) for two beneficiaries - the native Hawaiians and the general public. Section 5f of the Admissions Act says that the land is to be used for five purposes:

> The support of the public schools and other public educational institutions, **for the betterment of the conditions of native Hawaiians, as defined in the Hawaiian Homes Commission Act, 1920, as amended,** for the development of farm and home ownership on as widespread a basis as possible for the making of public improvements, and for the provision of lands for public use.

In 1985, the DLNR gave 27,000 acres of the Wao Kele O Puna to Campbell Estate in exchange for 25,000 acres at Kahauale'a. However, 15,000 acres at Kahauale'a are covered with freshly erupted lava, 1,200 acres are wood chipped, and 5,600 acres is promised to the Volcano National Park. This leaves our public land trust with only 3,200 acres of forested land.

GEOTHERMAL POWER PLANTS WILL DESTROY THE FOREST FOREVER

Campbell Estate needed the land exchange after Pele began to erupt right at the center of their Kahauale'a lands where they had planned to dig geothermal wells. The developer of this geothermal project is True/Midpacific Geothermal Company out of Wyoming. They want to dig up to 200 wells and build as many as 5 power plants to generate as much as 500 megawatts to transport to O'ahu through an undersea cable for which there is no available technology. The forest will be cleared so that miles of roads and piplines can be built for the complex of electric plants and transmission lines, including cooling towers and acres of dropout ponds where water contaminated with waste chemicals will slowly seep into the Puna water table. Like the existing HGPA power plant in Pohoiki, these plants will emit foul odors and poisonous gases that will cause respiratory sicknesses and kill off the native forest life. The Puna forest sits on top of the active rift zone at the epicenter of earth tremors and earthquakes. Pele is activley erupting in this zone. Any electric plant that is built there will be vulnerable to leakage, faulting and could collapse.

TRADITIONS OF THE WAO KELE O PUNA FOREST

Wao Kele O Puna, meaning Puna rain belt, is the last lowland tropical rainforest on Hawai'i. It was set aside aside as a Natural Area Reserve to protect the native Hawaiian plants, birds and insects who dwell there. 95 percent of the plants and animals in this forest cannot be found anywhere else in the world and several are already endangered.

In Pele traditions, the plants and trees of the Puna forest are kino lau or body forms of family members of Pele who help to calm the more agressive nature of the volcano. The forest is a natural filter for gases that are emitted by the volcano. The trees and plants found here help the forest to grow back and regenerate after a lava flow. Their ecosystem amidst active volcanism is important to learn about the evolution of all life. The forest is alive with medicinal plants for healing such as 'ama'u, moa, pa'i niu. It is lush with fern, maile and 'ohi'a lehua used by hula dancers for dress and lei. It has woods used for carving.

NATIVE HAWAIIAN GATHERING RIGHTS

Hawaiians have traditional rights to gather plant materials for medicinal, household and religious puroses. The law states that tenants within an ahupua'a have the right to enter undeveloped lands to gather materials needed for practicing native Hawaiian customs and traditions, such as firewood, house-timber, aho cord, thatch, or ki leaf. The exchange of this public land to Campbell Estate will cut off traditional public access to the forest for gathering of plant materials and for hunting.

TAXPAYERS AND CONSUMERS WILL PAY THE BILL

Geothermal energy will not reduce our reliance on foreign oil. Only 30 percent of imported fossil fuels are used to generate electricity, the rest is used for transportation. The State of Hawai'i has never done an in-depth least-cost energy study to justify its geothermal policy. Such a study would show that it is an exorbitant, highly speculative and dangerous source of electricity. The total cost to develop geothermal electricity for O'ahu, including the cable is $4 billion. By comparison, the total operating budget of the County of Hawai'i for one year is $70 million. Taxpayers, nationally and locally, will pay the cost of developing geothermal energy. Rate payers will pay much higher utility bills for many years to come, like the utility consumers in Washington State. They will be paying back bonds that were issued to build 5 nuclear plants over the next 20 years, when only one will actually ever be built.

ONLY HAWAIIAN ESTATES AND UTILITY COMPANIES WILL BENEFIT

Who will benefit from geothermal energy? Not the taxpayers, not the users of electricity, not the native Hawaiians, and not the residents in the surrounding agricultural communities. The Campbell, Lyman and Bishop Estates; True/Midpacific Geothermal Company and Ormatt; as well as HELCO, HECO and HEI will all profit from geothermal energy development.

STATE OF HAWAI'I IS PAYING FOR GEOTHERMAL DEVELOPMENT

The Ariyoshi administration made it very easy for Campbell to get permits for geothermal energy plants in theWao Kele O Puna. In addition to the illegal ceded land swap, environmental and archaeology studies were not required for drilling at Wao Kele O Puna. The State of Hawai'i's Department of Business and Economic Development has contracted the University of Hawai'i to drill scientific observation wells which will explore the amount of volcanic heat and steam available to generate electricity.

IT'S NOT TOO LATE TO ACT

You can kokua your support NOW while we still have a chance:

* Join our gathering exercise on October 14, 1989 at noon in the Wao Kele O Puna (meet in the Pahoa School Parking Lot).

* Send a contribution to help bring people together for direct action to protect the forest - Pele Defense Fund P.O. Box 404 / Volcano, Hawai'i 96785

* Express your concerns against geothermal development to: Bill Paty / Department of Land and Natural Resources / 1151 Punchbowl St. / Honolulu, Hawai'i 96813.

31

TO: CHUCK FREEDMAN

FROM: DOUG CARLSON

I'm also sending a copy of Bill Bonnet's letter to Pat Takahashi about a recent Ka Leo O Hawaii editorial.

Your material reads well and supports the state's position. The opponents, of course, will pop up elsewhere. One thing they might say is that, notwithstanding all the good intentions of the state, there are more endangered species in Hawaii than anyplace else in the world. (I just heard that on the radio.)

Talk to you next week.

(Total of 10 pages, including this one)

Roger - Suggest you throw your entire PR resources into this battle

Chuck

10/7

San Francisco Chronicle
Sunday - Oct. 1 - 1989

VANISHING RAIN FORESTS

TROUBLE AT HOME

Geothermal development imperils Hawaii's rain forest

BY RICK CARROLL

Ola'a Rain Forest, Hawaii

On the Big Island that gives its name to "the loveliest fleet of islands," as Mark Twain once wrote, there is a tropical rain forest like no other in the world.

The Ola'a, as it's called, is an old Hawaiian name for the legendary sacred area where early Hawaiians went to collect bird feathers, although some say it also means "life" or "healing."

Few people know it exists, although it is at least 10,000 years old and full of incredible creatures who live in arboreal splendor near the red-hot heart of the erupting volcano island.

Picture the fictional Green Mansions, but this is a true Eden, free of stinging insects, poisonous vipers and fanged reptiles. Enter and you disappear into a Hawaii that exists in the imagination of all who yearn for Paradise.

In misty sunlight, honeycreeper birds suck nectar from red ohia blossoms, ferns grow big as trees and the gray-green ohia trees form a canopy that shelters all. It is easy to picture a dinosaur grazing in the cool shadows.

All is not perfect in the rain forest. Wild pigs root up ferns on the spongy forest floor, and alien plants such as banana poka choke out Hawaii's native species. Then there is man.

And what a grandiose plan he has. He will drill 200, maybe 300 wells or more, 8,000-feet deep into the hot magma in the field of greatest seismic activity on the eastern rift of Kilauea Volcano, the most active volcano on Earth, then extract hot steam and convert it to 500 megawatts of electricity.

The power will be transmitted overland and underwater through the longest, deepest cable ever laid in Hawaii — more than 150 miles in length at depths of 6,000 feet between the Big Island and Maui, to Oahu's Waimanalo Bay on the windward shore.

The goal is to free Hawaii's dependency on foreign oil and reduce consumer electric bills, which are among the nation's highest.

This geothermal project, estimated to cost in excess of $1.5 billion, is about to commence in the Wao Kele 'O Puna rain forest, on former state conservation land on the outskirts of gloomy Hilo, with the blessing of Hawaii's Governor John Waihee.

Geothermal, the governor says, is "the key to achieving our state goal of energy self-sufficiency."

Some of the world's largest developers, including Pacific Gas & Electric-Bechtel Generating Co. and Fluor Daniel Inc., of California, and Japan's C. Itoh & Co., have expressed interest in developing geothermal power here.

The first site is in a rain forest preserve above Pahoa, a small rural village of about 7,000 people who now have front row seats to watch what natural scientists say will be the destruction of the last tropical lowland rain forest in the United States.

No tour buses go to the rain forest. It isn't advertised or mentioned in guidebooks. If you can find the rain forest on the Big Island map, it appears in very small type.

So most people don't know there is a rain forest here. In fact, there are several, the two largest of which are the 9,000-acre Ola'a in Volcanoes National Park and the nearby 16,000-acre Wao Kele 'O Puna (wao kele means "green forest"), where the drilling is about to start.

Together, they form a 25,000-acre mosaic of rain forest that spills down from 4,970 feet over the eastern slope of Kilauea Volcano on the Big Island.

The Ola'a is bypassed daily by 1.8 million tourists who enter Volcanoes National Park in search of the high drama of a live volcano. The Wao Kele 'O Puna is off the tourist trail and seldom visited.

That is too bad, because it is a biological treasure: the last lowland stand of birds, plants and insects that live nowhere else in the world, like the rare yellow-headed, parrot-beaked 'O'u honeycreeper. Once common in Hawaii, it was last seen four years ago.

If there were jaguars or crocodiles here, Hawaii's rain forests probably would be world-famous attractions. Instead, its inhabitants are oddities, like the Happy Face spider, the world's only known "killer" caterpillar (it feeds on other insects) and the hoary bat.

Such creatures excite mainly scientists, who consider the islands "the best theater for evolution in the world" — greater even than Darwin's Galapagos Islands because of Hawaii's isolation in time, distance and environmental variation.

The biota of Hawaii is unique. Ninety-five percent of the state's flowering plants and 97 percent of its animals, including birds, live only in Hawaii, many only in the rain forests. In plant life, the rain forest "probably contains the richest assemblage of genera and species," wrote Harvard-educated botanist Sherwin Carlquist in "Hawaii: A Natural History."

The array of plant species, Carlquist wrote, also appears "more exclusively Indo-Malaysian, with relatively few American elements. It is more like forests in Queensland, New Guinea, the Philippines, Indonesia, Fiji and other Pacific Islands."

Though Hawaii's native rain forest appears luxuriant, it is vanishing.

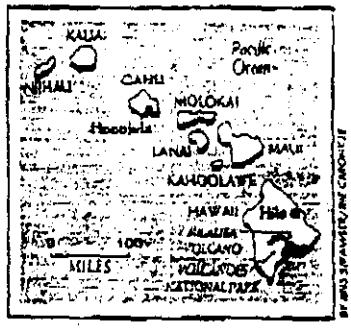
Only 200 years ago, it covered nearly half of all the islands' surface. Now it covers less than 10 percent, according to aerial field surveys begun in 1976 by botanist James D. Jacobi, chief of the Hawaii Research Center.

"The lowland forest has been hardest hit," Jacobi said, "but the Puna area remains undisturbed and still has dominant native plants."

Plantations, ranches and urban developers all have claimed more than 60 percent. The first Polynesians and early Hawaiians did their part, and Kilauea's lava flows have claimed the rest.

"The rain forest is delicate, nonrenewable and collapsing fast," said Dan Clark, the

Ralph Pulikapu Daubman, president of the Pele Defense Fund, which opposes the geothermal project.



BY JAN SCHAEFFER/THE CHRONICLE

Former Chronicle reporter Rick Carroll covers the Pacific Rim as a Honolulu-based free-lance writer. He is a contributor to 'The Penguin Guide to Hawaii 1990,' to be published this month by Penguin Books of London and New York.

National Park Service's resources management chief at Volcanoes National Park. Clark protects the Olo as an a wilderness area, by congressional order.

Ideally, he said, the Olo's should be surrounded by buffer zones to protect birds and insects, which know no political boundaries.

"The irony," Clark said, "is that while everyone is running around saving the rain forests of South America, our own is about to be destroyed. We should take care of our back yard first, before we set out worrying so much about destruction in South America.

"You can't sacrifice something irreplaceable like a rain forest ... to satisfy an insatiable hunger for air conditioning and neon lights. That's a sacrilege, and that's not why we're here."

Up to now, the big 500-megawatt geothermal project proposed by wildcat drillers from the Wyoming-based True/Mid-Pacific Corp. has attracted only local opposition from grassroots native Hawaiian organizers and downwind neighbors concerned about foul air, polluted water and toxic emissions.

A smaller 25-megawatt plant on a nearby 500-acre site is planned by the Israeli-owned Ormat Energy Systems. That project recently was approved the Hawaii County Planning Commission despite local opposition.

But while health risks are understandably paramount, few Big Island residents seem concerned about the rain forest's demise. "What rain forest?" people ask when you tell them where you are going. If a rain forest is bulldozed to lower electricity rates, then what's a few already endangered birds?

The process that begins with the felling of a few 100-foot ohia trees (a hardwood of the myrtle family) for an access road to a geothermal site in the Wao Kele 'O Puna rain forest may end in what biologists call a "catastrophe," forcing thousands to flee a cloud of hydrogen sulfide.

"One accident involving a long period of uncontrolled venting could cause an ecological disaster for birds and probably most other small plants and animals near the development," said Sheila Conant, a University of Hawaii ornithologist.

Catastrophe already has come, on a small scale, in Leilani Estates, a tidy subdivision across the street from the state's first geothermal plant, a 3-megawatt demonstration plant built in 1981 for Hawaiian Light & Power Co. to electrify a few thousand homes. It looks like a rusty old incinerator and smells like rotten eggs.

The day I visited the rain forest, a "malfunction" in the plant's muffler caused poisonous hydrogen sulfide gas to leak for 48 hours. The intense odor forced 10 people to flee their homes overnight. The gas was found to contain 27 parts per billion of hydrogen sulfide, or six times higher than the level acceptable to the Environmental Protection Agency. Officials described the gas leak as "not health threatening" but a "severe nuisance." Multiply that by 100 wells and Hawaii starts to smell very rotten, indeed.

Several days later, the state shut the demonstration plant down.

... Maurice Richards is the development manager for Puna Geothermal Venture, an outfit not in the environmental crossfire and most likely to succeed. Richards is optimistic that sound geothermal development will reduce Hawaii's dependency on fossil fuels.

BY PAUL CALDER, SPECIAL TO THE CHRONICLE

Emmett Aluli of the Pele Defense Fund

"Our competitors are in the more pristine conservation land, the rain forest area," said Richard. "We're down in agricultural land in the lower end of Puna, and in that district there are different environmental conditions."

The Puna Geothermal Venture is a 25-megawatt plant on 500 acres, designed to supply power for the Big Island only. Richard expects it to be in operation by the end of the year.

"Geothermal will be successful in Hawaii," Richard said, "because it's the most environmentally sound resource. It will, in the case of our 25-megawatt project, reduce the need for 20 million barrels of fossil fuel a year. In doing so, it will reduce the overall environmental air emissions by 50 percent during the night and 20 percent during the day by not burning fossil fuels."

Opponents of geothermal development in the rain forest fear that trouble will begin as soon as the bulldozer blades hits the ground.

"Succession after disturbance" is a phenomenon any home gardener knows too well. The raw earth is invaded by alien plants — "weedy" species like strawberry guava, Hilo grass and Koster's curse — which take root, forcing native plants out. A rain forest can become a weed patch almost overnight.

"Once an area is cleared of native species, it will never come back to its present state," said Dr. Peter M. Vitousek, a Stanford University professor of biological sciences. "Alien plants and the birds and insects they support will dominate any regrowing vegetation. Consequently, the area will lose much of its unique character and scientific and cultural value."

To scientists, the Hawaiian rain forest is a valuable natural laboratory. "Nowhere else on Earth," Vitousek said, "is there such a spectacular matrix of climate and soils occupied by plants and animals whose evolutionary history is so well known.

"Work in Hawaii, therefore, can allow us to determine what controls the way tropical forests grow and develop all over the world — something that we need more and more as the global consequences of tropical deforestation become apparent."

The irony is that while everyone is running around saving the rain forests of South America, our own is about to be destroyed. We should take care of our back yard first.

—Dan Clark,
Resources Management Chief
at Volcanoes National Park

Already D-9 bulldozers are carving access roads three miles above Pahoa School in the lowland Wao Kele 'O Puna rain forest so that exploratory well drilling may commence.

We visited the Wao Kele 'O Puna with Emmett Aluli, one of the leaders of the Pele Defense Fund, named for the Hawaiian goddess of fire, which is the chief opponent of geothermal development. We were prevented from entering the rain forest by a new steel gate guarded by an armed off-duty cop.

"Stop, go no farther," ordered the Hilo police sergeant at the gate to the rain forest. On his first day on the job, the officer seemed unsure of his new role as gatekeeper for the drilling crews, especially since he, like the two men seeking entry, is a native son of Hawaii.

"This is our land, Hawaiian land," said Emmett Aluli. "Your gate is illegal, pending a court decision in San Francisco."

It is to no avail. The new gate may be illegal, but to cross it, the officer warns, is criminal trespass. It is a classic Iran Noriega standoff: under a blazing sun, and San Francisco judges are 2,000 air miles across the Pacific.

"It's wrong for you to take this job," Aluli told him. "Don't do it, bruh. This is Pele's land, ceded Hawaiian land. We have a right to be here. This is a rain forest."

"I didn't know it was a rain forest," the policeman said. The informational breakthrough is a very small victory in the face of the raw gash of new road that indents the Wao Kele 'O Puna like a missing front tooth.

A small band of native Hawaiians (the Pele Defense Fund) wages a daily David-style battle against the Goliath of geothermal development from a rented office in a failed Hilo tourist hotel.

The leaders, Aluli and Ralph Palikapu Dedman, have joined with the Rainforest Action Network of San Francisco to call for an unprecedented national boycott of Hawaii's tourism industry and such Big Island products as macadamia nuts, anthuriums and Kona coffee.

The boycott, a canny ploy to bring Hawaii's rain forest to center stage, is not likely to reduce Hawaii's 6.2 million annual visitor count, especially in winter, but Aluli and Dedman are steadfast.

"For us," Dedman said, "it is a sacrilege to keep poking holes in Pele's body to capture her steam and destroy her rain forests so people can make money."

To native Hawaiians, Pele, the goddess of fire, daughter of the Earth Mother and Sky Father, is an ever-present entity who both creates and destroys. Aluli reminds skeptics that when the Campbell Estate (one of Hawaii's most influential landowner families, the Campbells descended from early Christian missionaries) planned geothermal development on native land in 1982, Pele covered 10,000 acres with lava.

The Rainforest Action Network, Dedman and Aluli said, plans to install informational pickets at West Coast airports with direct flights to Hawaii. They said the campaign could escalate to civil disobedience at the rain forest gate with mass demonstrations and arrests.

"The Hilo jail only holds 52," Aluli said. "What if we had 100 people a day arrested for trespassing?"

A medical doctor who uses traditional Hawaiian herbs and potions for healing, Aluli, 45, is a survivor of other island battles. He is still trying to stop the U.S. Navy's bombing raids on Kahoolawe. Dedman, a Big Island fisherman, co-founded the Pele Defense Fund in 1983 and serves as the organization's president.

The group fought geothermal development in Hawaii's courts in 1986, charging a violation of their First Amendment constitutional right to practice native Hawaiian religion in the rain forest. The case was rejected as invalid by the Hawaii Supreme Court, and the U.S. Supreme Court declined to hear the case.

The Pele Defense Fund has also challenged the legality of a 1959 land swap in which the state gave the Campbell Estate 27,000 acres in and around the Wao Kele 'O Puna rain forest for geothermal projects. The suit, dismissed on technicalities in Hawaii's U.S. District Court, is on appeal before the U.S. Ninth Circuit Court in San Francisco.

"Geothermal is not safe, not clean and

See Page 23

Continued From Page 9

not economical," Randy Hayes, president of the Rainforest Action Network, said after returning from Hawaii in July. "It will not decrease Hawaii's dependency on oil because it will fuel further growth."

The nationwide boycott of Hawaiian products, he pledged, will be bigger than the Burger King boycott organized by RAN, which Hayes says forced the multinational hamburger chain to cancel $25 million worth of beef contracts with countries that convert rain forests to cattle pasture.

Nobody at the Hawaii Visitors Bureau wants, officially, to gauge the potential impact, if any, of a boycott on the $8 billion-a-year tourist industry. The state's top industry contributes to the $65 million state budget surplus and the lowest unemployment (1.5 percent) in the nation.

It is raining now in the Ola'a rain forest, as it does every day and night. Some years are wetter than others. This year has seen a record 300 inches of precipitation, so the forest is emerald green and glistening. In the half-light of the rain forest, a wing flash of shadows plays against ostrich-necked ferns. Honeycreepers, bright as jewels, crowd a flame red ohia blossom to sip nectar. Everything seems perfect, as it should be in Paradise.

Forty minutes away by Aloha Airlines jet, Waikiki's skyline burns kilowatts at hyperspeed, bright as a Saturday night carnival in Kansas. The only bird that thrives here is a man in a Woody Woodpecker costume hawking condo time-share flyers.

Real birds, such as pigeons, mynahs and English sparrows, are poisoned by hotels to keep lanais spotless so tourists don't complain.

Hawaii's native birds may be found in Oahu's Bishop Museum, stuffed and mounted, or with their bright green, yellow and scarlet feathered skins dried and pinned down in glass display cases like old ladies' hats. A specimen of the rare 'O'u honeycreeper is there, along with others who slipped off the endangered list into museum exhibits, victims of a changing island way of life. The Hawaiian crow may be next.

Someday, Hawaii may get cheap electricity to chill tourist hotel rooms by tapping Pele's volcano, but the 'O'u honeycreeper will pay the price. *Aloha*, they say here. It means hello, good-by and, sometimes, love. ■

VANISHING RAIN FORESTS

PARADISE LOST

In the name of profit, the world's rain forests are going up in smoke

BY CATHERINE CAULFIELD

Tropical rain forests are the richest, oldest and most complex ecosystems on Earth. Although they cover less than 2 percent of the globe, they contain its greatest diversity of plant and animal life. Rain forests are home to 40 to 50 percent of all types of living things — as many as 5 million species of plants, animals and insects.

Temperate regions are poor by comparison. For instance, Great Britain, which is 50 times as big as the Pacific island of New Caledonia, has 1,430 species of flowering plants; New Caledonia has 3,000 species, and 80 percent of those species grow only there. In a 300-square-mile area of forest on the border of Panama and Costa Rica, biologists found more than 600 resident bird species, four times as many bird species as there are in all the broad-leaved temperate forests of eastern North America.

Yet at least 50 million acres of tropical rain forest are destroyed each year. That's 100 acres every minute. Already more than half the globe's original rain forest has disappeared, and the United Nations predicts that unless something is done, another 20 to 25 percent will be lost by the end of the century — just 11 years from now.

In fact, the rate of deforestation is likely to increase. In order to sell the forests' timber, to get at the gold and iron underneath or to get more land for agriculture, vast industrial developments are under way or are being planned in most of the few remaining unspoiled areas. And the logging industry is turning its attention from the depleted forests of Southeast Asia to the relatively untouched riches of Amazonia.

Our understanding of the dynamics and composition of tropical rain forests is elementary compared with our knowledge of the much less complex temperate forests. In many ways modern scientific insight is rivalled or surpassed by the experience and traditional wisdom of the thousands of forest peoples who live in harmony with these rich and fragile habitats.

As man destroys the rain forests, millions of species of plants and animals, the vast majority of which are completely unknown to science, lose their habitats. Scientists have scarcely begun to ask how the human race might benefit from the products of the forest.

Fewer than 1 percent of tropical forest species have been examined for their possible use to mankind — that is, screened for chemical compounds. Yet one can judge their potential by the effect that rain forest species have already had. Without quinine, coffee and rubber the history of medicine, agriculture and industry would be unimaginably different.

A high proportion of animals and plants in tropical rain forests are endemic to one area — that is, they live nowhere else. This is especially true of Southeast Asia and Oceania, with its more than 20,000 islands. The forests of Papua New Guinea host 320 endemic species of birds, almost half its total bird population. Many species are confined to a single island or mountain range. This rarity itself makes rain forest species particularly vulnerable to extinction.

The combination of rarity and threat to habitats means that some species have disappeared before they were ever known to biologists. South American rivers have perhaps 2,000 as yet unnamed species of fish. In all likelihood many of these will become extinct before they are found by science.

Intact, the rain forest conditions the soil, maintains the water quality of major rivers and fisheries, protects against disastrous flooding and droughts, and increases local rainfall. Subtract the forest from the ground on which it stands, and with a few exceptions you are left with generally poor soil, often on steep slopes, subject to erosion and landslides.

These conditions have doomed most attempts to convert rain forest into profitable and enduring farms. Most attempts have failed disastrously, the soil exhausted, local streams silted up, downstream communities ravaged by floods and droughts and the settlers still desperate for land.

According to Brazilian government figures, 38 percent of all deforestation in the Brazilian Amazon between 1966 and 1975 can be blamed on agricultural colonization. Yet Brazil, which has a policy of moving settlers into the Amazon rain forest — supported by funds from the World Bank — does not need that land for agriculture. Taking potential farmland into account, but leaving aside Amazonia, each family in Brazil could have 10 acres. Instead, 4.5 percent of Brazil's landowners own 81 percent of the country's farmland, and 70 percent of the country's rural households are landless.

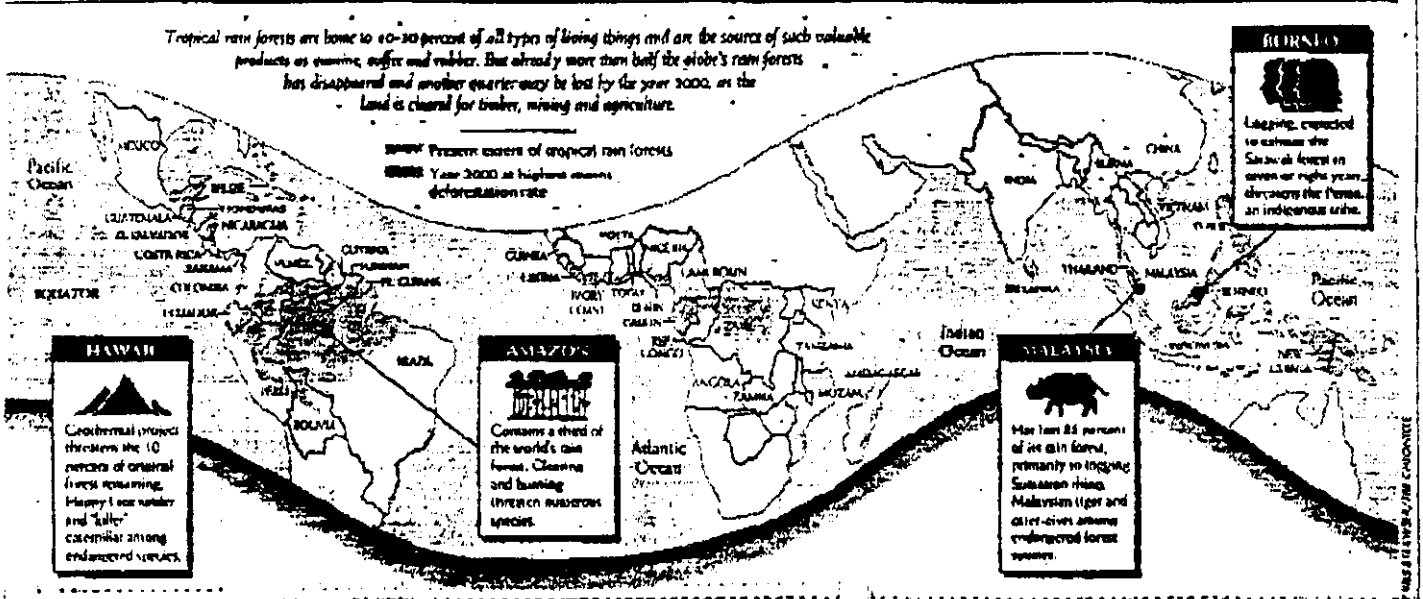
Raising cattle for export is the chief culprit in Latin America's deforestation. In Southeast Asia, Oceania and Africa, logging vies with peasant agriculture as the main cause of deforestation. According to figures from the United Nations, peasant agriculture in Indonesia affects half a million acres of rain forest a year, but that is only a quarter of the area annually affected by logging.

Nor is the destruction of the world's rain forests confined to impoverished Third World nations. Our own Hawaiian rain forests, among the richest in the world, are imperiled by geothermal development.

The permanent, wide-reaching benefits of the intact forest — the protection of wildlife, water catchments and soil; and the provision of food, medicines and building materials — are being sacrificed for short-term profits for a small group of investors and consumers. And the rest of the world is the poorer for it. ■

Catherine Caulfield is the author of 'In the Rainforest' (Knopf, 1984). Excerpted in The New Yorker, her book was one of the first to warn of the destruction of the world's rain forests. Her latest book, 'Multiple Exposures: Chronicles of the Radiation Age,' was excerpted in This World on July 23.

WORLDWIDE DEFORESTATION: LOSING THE FORESTS' SECRETS AND RISKING EARTH'S FUTURE



THE AMAZON IN FLAMES

No one knows exactly how much of the world's largest rain forest is already gone

BY CHARLES PETIT

A thought came to mind as my head struck the roof of a stiffly-sprung four-wheel-drive Toyota: Somebody ought to be sensible and save this abysmal excuse for a highway.

The truck was bouncing along a horrendously potholed dirt road north of Manaus, home to a million people and the capital of Amazonas, a state the size of Alaska in the heart of Brazil's imperiled rain forest.

A few moments later the car's driver swore softly, swearing in the morning sun as he struggled to hammer loose a rusted bolt that held the spare. In the hard red dirt a tire had blown out on a rut deep enough to swallow a small child.

Two men and two women and several tiny children, farmworkers and their families given rides by the driver as we headed for a remote scientific station, stood and waited patiently in the shade at the roadside, under trees that 15 years ago were part of an unbroken rain forest.

Good roads would mean the poor — a multiracial Brazilian peasant mix ranging in blends from African black to Nordic blond and native Indian — who live along the roads wouldn't have to pay so much for goods. They could get their own meager produce to market more easily. They wouldn't have such a hard time getting around. It would civilize things for this share of Brazil's 145 million citizens.

At the same time, a mental alarm went off: Roads are what are wrecking the world's greatest forest. Roads ease the way for cattle pastures, marginal farms, logging, gold mines, iron mines and colossal dams that flood enormous areas for paltry yields of hydroelectric power.

What the Amazon ecosystem needs is no roads at all.

That, however, is out of the question. An American diplomat stationed for several years in Brasilia, the capital carved by the former military dictatorship out of the countryside south of the rain forest in the late 1950s, said, "Environmental concerns are a luxury of the rich, and this is not a rich country. Brazilians are not going to just preserve the Amazon. They are going to develop it. The question is, how."

To the people who already live here, many of them refugees from the crowded *favelas* or shantytowns around Brazil's big cities, the urge to improve a road is likely to be stronger than any faraway environmentalist's suggestion to stop building roads, much less to let the 22,000 existing miles of roads wash away and overgrow. Furthermore, Brazil's military may no longer be officially in charge of the country, where hard-fought presidential elections are due in November, but its worry that a roadless Amazon is an undefendable Amazon still carries a lot of weight.

The diplomat went on: "Bullying Brazil won't do much good. It won't do to lecture Brazilians about the Amazon. We should make them believe we don't regard them as

In Brazil, between Xapuri and Rio Branco, a rain forest area cleared for cattle pasture smolders long after burning

Charles Petit covers science for the Chronicle.

William A. Bonnet
Manager
Environmental Department

October 5, 1989

Mr. Patrick K. Takahashi
Director, Hawaii Natural Energy Institute
University of Hawaii
2540 Dole Street
Honolulu, Hawaii 96822

Dear Pat:

Thanks for sharing the 9/20/89 editorial from Ka Leo O Hawaii. I am disappointed that the Editorial Board has allowed itself to be influenced by anti-geothermal sentiment. The University of Hawaii holds itself out to the community as a progressive institution, where balanced consideration of local, national and international issues helps prepare students to exercise reasoned judgment and contribute to appropriate decisions. I do not see evidence of balance or reason in the editorial; it contains logic which is not indicative of an open or inquisitive mind.

The second paragraph implies subterfuge or conspiracy in the temporal relationship between the SOH program and the Ormat commercial development. Ormat has signed a contract to deliver 25 megawatts of much-needed power to HELCO; that will occur whether the slim-hole research proceeds or not. The innuendo is without foundation. All other ostensible objections to the SOH program are objections to commercial geothermal, not the SOH program. This absence of legitimate discussion of the SOH program suggests that the Editorial Board objects to the gathering of information for the purpose of improving knowledge: an interesting position for an educational institution. Even if the objections are applied to commercial development, they do not prevail.

The implication, both here and elsewhere (October 1 San Francisco Chronicle), that geothermal development will destroy the rain forests and all that live therein, is an interesting conclusion before a programmatic EIS has even been prepared. Geothermal development will impact the rain forest, but to speak in terms of destruction before the program has been defined is quite a leap.

Government agencies and private sector commercial interests are so often accused of reaching a conclusion before adequate information has been acquired to address an issue. That may in some cases be true, but the problem is broad, as indicated by this unsupported conclusion heard somewhere and passed on by the Editorial Board. We have an environmental review process; those it was meant to serve should honor it.

"To drill into the volcano would be ... to desecrate their church." The Board of Ka Leo has cavalierly overturned the Supreme Court of the State of Hawaii, without acknowledgement or justification.

"The plant will create noise pollution." As is the case with the Ormat contract, any geothermal project (or <u>any</u> project, for that matter) must comply with State noise standards and County ordinances. These are generally written into permit conditions (see SOH and Ormat geothermal permits). If the facility (geothermal or otherwise) complies with these requirements, there is no excessive noise and hence no noise pollution by definition (HRS 342-41). The statement by the Ka Leo Board indicates that a geothermal plant <u>will</u> exceed its permit conditions; this is an unfair and unsupported statement of future occurrences.

The editorial describes the characteristics of hydrogen sulfide gas, implying (by its silence) that the emission of this gas (produced by the well not the plant) is uncontrolled. That is not the case. I would suggest discussion with operators of the Geysers and California health officials before deciding how a commercial geothermal operation will perform.

The Ka Leo Board ignores, intentionally or not, the many publications and media information on HGP-A's purpose as a research facility, referencing it only as "a geothermal energy plant in Puna". It is not "a" plant, it is "the" plant, owned and operated by the University (RCUH). Everyone has agreed it has served its purpose, outlived its useful life (exceeded its design life by a factor of four), and is to be shut down. It is sad that the Board portrays its malfunction as a day in the life of a typical commercial facility.

Finally, with regard to the non-polluting alternatives like wind and OTEC. I suggest the Board review testimony from environmental review public hearings of windfarms and the proposed OTEC facility at Kahe. There was less than unanimity that these are "non-polluting".

While there may be legitimate issues associated with geothermal development on the Big Island, the Ka Leo editorial sheds no meaningful light on them. It is a pre-conceived and unfair view of the world and gives disturbing evidance that within the University is perpetuated a value system which finds its ultimate satisfaction in "stopping something". I hope HNEI will see fit to challenge the Ka Leo position.

Sincerely,

B. U. Bowman

xc: R. L. O'Connell w/enc
D. Carlson w/enc
J. F. Richardson w/enc

Opinion

Bad outweighs good in geothermal wells

The University of Hawaii's Natural Energy Institute will be drilling four geothermal wells on the Big Island — two on the lower east rift zone and two on the middle east rift zone of Kilauea volcano. The institute should not take that step.

The university states that the wells are intended for scientific observation and assessment of the geothermal resource. But close on the heels of the assessment, a developer will erect a geothermal plant that would produce electricity by harnessing the volcano's steam and gas to drive turbines.

Though the plant could somewhat reduce Hawaii's dependence on fossil fuels to generate needed electricity, potential losses far outweigh potential gains from the project.

The project will require clearing part of the last low-lying rain forest in the United States, *Wao Kele O Puna*, an 8,000-acre area that is home to plants and animals found nowhere else on Earth, including several endangered species. It is offensive that this unique area and its life forms would be disturbed — and possibly destroyed — in pursuit of electrical energy.

In addition, the area is sacred to practitioners of the native Hawaiian religion. To drill into the volcano would be — in effect — to desecrate their church.

The plant will also create noise pollution. It will produce hydrogen sulfide, a gas that smells like rotten eggs and is sickening at low levels and lethal at high levels.

A university spokesman told Ka Leo that "all the dangers of geothermal wells" had been addressed. But within two weeks of that statement, an equipment malfunction at a geothermal energy plant in Puna released enough hydrogen sulfide into the air to reach "severe nuisance" levels in a nearby subdivision.

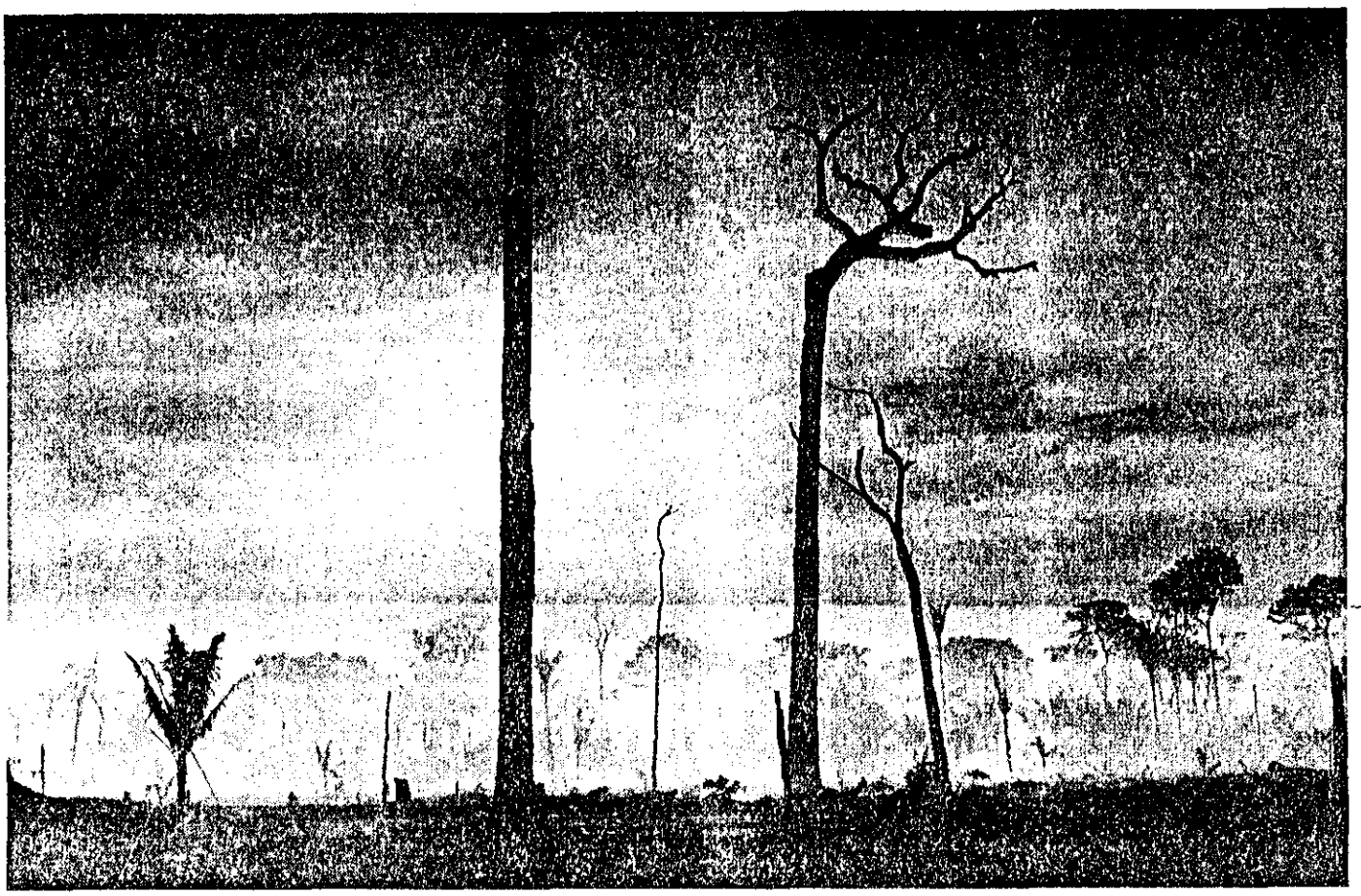
Geothermal energy carries too many negatives to make it worthwhile. We should take more advantage of non-polluting solar- and wind-generated power and further explore the promise of ocean thermal energy. None of those sources will harm our beautiful island home.

San Francisco Chronicle

This World

SPECIAL ISSUE

October 1, 1989



Vanishing Rain Forests

Half the Earth's tropical rain forests are gone. One hundred acres are destroyed every minute. And we're running out of time to save the rest.

■ HAWAII ■ THE AMAZON ■ BORNEO ■ PENINSULAR MALAYSIA

TOP PHOTO BY SCOT [illegible] THE CHRONICLE BOTTOM PHOTO BY JOHN WENNERSTEN OF THE CHRONICLE

VANISHING RAIN FORESTS

PARADISE LOST

In the name of profit, the world's rain forests are going up in smoke

THERINE CAUFIELD

Tropical rain forests are the richest, oldest and most complex ecosystems on Earth. Although they cover less than 2 percent of the globe, they contain its greatest diversity of plant and animal life. Rain forests are home to 40 to 50 percent of all types of living things — as many as 5 million species of plants, animals and insects.

The temperate regions are poor by comparison. For instance, Great Britain, which is 20 times as big as the Pacific Island of New Caledonia, has 1,430 species of flowering plants. New Caledonia has 3,000 species, and 90 percent of those species grow only there. In a 10,000-square-mile area of forest on the Atlantic coast of Panama and Costa Rica, biologists have recorded more than 500 resident bird species, more species than as many bird species as there are in the entire broad-leaved temperate forests of Europe and North America.

Each year at least 50 million acres of tropical rain forest are destroyed each year. That's the equivalent of 100 acres every minute. Already more than half of the globe's original rain forest has disappeared, and the United Nations predicts that unless something is done, another 20 to 40 percent will be lost by the end of the century — just 11 years from now.

In fact, the rate of deforestation is likely to increase. In order to sell the forests' timber and get at the gold and iron underneath them, more land for agriculture, vast industrial developments are under way or are being planned in most of the few remaining unspoiled areas. And the logging industry is turning its attention from the depleted forests of Southeast Asia to the relatively untouched riches of Amazonia.

Our understanding of the dynamics and composition of tropical rain forests is elementary compared with our knowledge of the much less complex temperate forests. In many ways modern scientific insight is rivaled or surpassed by the experience and traditional wisdom of the thousands of forest peoples who live in harmony with these rich and fragile habitats.

As man destroys the rain forests, millions of species of plants and animals, the vast majority of which are completely unknown to science, lose their habitats. Scientists have scarcely begun to ask how the human race might benefit from the products of the forest.

Fewer than 1 percent of tropical forest species have been examined for their possible use to mankind — that is, screened for chemical compounds. Yet one can judge their potential by the effect that rain forest species have already had. Without quinine, coffee and rubber the history of medicine, agriculture and industry would be unimaginably different.

A high proportion of animals and plants in tropical rain forests are endemic to one area — that is, they live nowhere else. This is especially true of Southeast Asia and Oceania, with its more than 20,000 islands. The forests of Papua New Guinea host 320 endemic species of birds, almost half its total bird population. Many species are confined to a single island or mountain range. This rarity itself makes rain forest species particularly vulnerable to extinction.

The combination of rarity and threat to habitats means that some species have disappeared before they were ever known to biologists. South American rivers have perhaps 2,000 as yet unnamed species of fish. In all likelihood many of these will become extinct before they are found by science.

Intact, the rain forest conditions the soil, maintains the water quality of major rivers and fisheries, protects against disastrous flooding and droughts, and increases local rainfall. Subtract the forest from the ground on which it stands, and with a few exceptions you are left with generally poor soil, often on steep slopes, subject to erosion and landslides.

These conditions have doomed most attempts to convert rain forest into profitable and enduring farms. Most attempts have failed disastrously, the soil exhausted, local streams silted up, downstream communities ravaged by floods and droughts and the settlers still desperate for land.

According to Brazilian government figures, 38 percent of all deforestation in the Brazilian Amazon between 1966 and 1975 can be blamed on agricultural colonization. Yet Brazil, which has a policy of moving settlers into the Amazon rain forest — supported by funds from the World Bank — does not need that land for agriculture. Taking potential farmland into account, but leaving aside Amazonia, each family in Brazil could have 10 acres. Instead, 4.5 percent of Brazil's landowners own 81 percent of the country's farmland, and 70 percent of the country's rural households are landless.

Raising cattle for export is the chief culprit in Latin America's deforestation. In Southeast Asia, Oceania and Africa, logging vies with peasant agriculture as the main cause of deforestation. According to figures from the United Nations, peasant agriculture in Indonesia affects half a million acres of rain forest a year, but that is only a quarter of the area annually affected by logging.

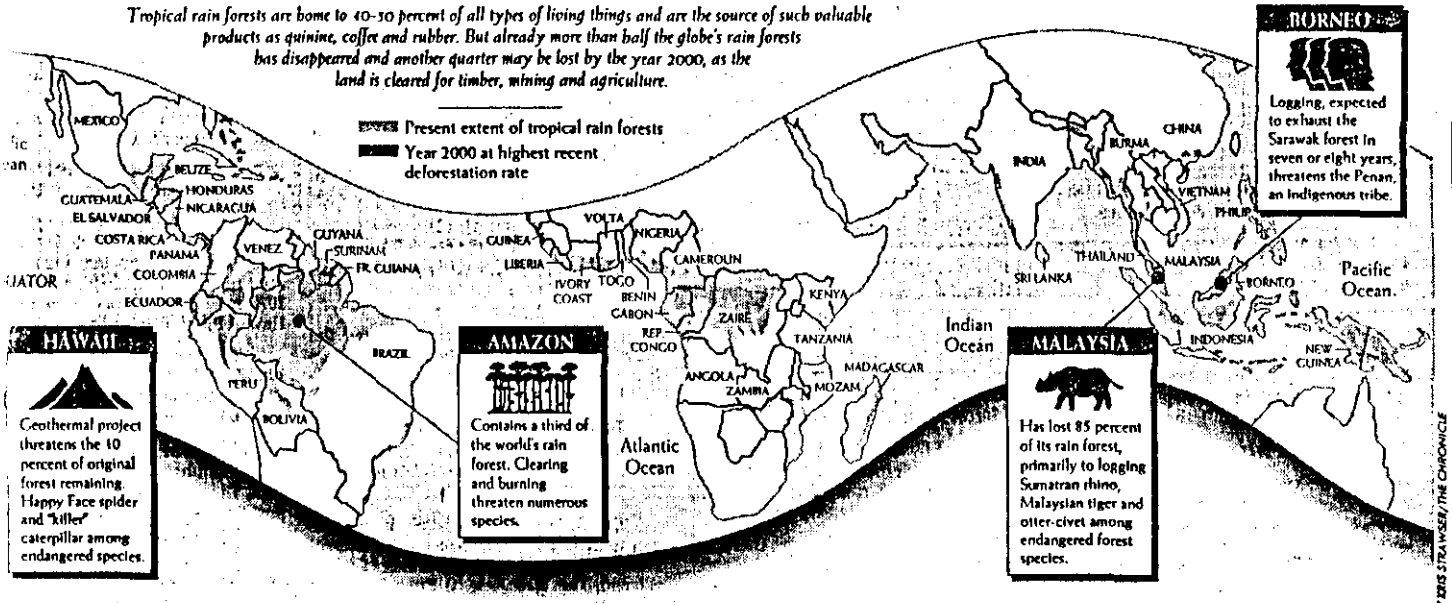
Nor is the destruction of the world's rain forests confined to impoverished Third World nations. Our own Hawaiian rain forests, among the richest in the world, are imperiled by geothermal development.

The permanent, wide reaching benefits of the intact forest — the protection of wildlife, water catchments and soil; and the provision of food, medicines and building materials — are being sacrificed for short-term profits for a small group of investors and consumers. And the rest of the world is the poorer for it. ■

Catherine Caufield is the author of 'In the Rainforest' (Knopf, 1984). Excerpted in The New Yorker, her book was one of the first to warn of the destruction of the world's rain forests. Her latest book, 'Multiple Exposures: Chronicles of the Radiation Age,' was excerpted in This World on July 23.

LDWIDE DEFORESTATION: LOSING THE FORESTS' SECRETS AND RISKING EARTH'S FUTURE

Tropical rain forests are home to 40-50 percent of all types of living things and are the source of such valuable products as quinine, coffee and rubber. But already more than half the globe's rain forests has disappeared and another quarter may be lost by the year 2000, as the land is cleared for timber, mining and agriculture.



BY KRIS STRAUSER/THE CHRONICLE

TROUBLE AT HOME

Geothermal development imperils Hawaii's rain forest

BY RICK CARROLL

Ola'a Rain Forest, Hawaii

On the Big Island that gives its name to "the loveliest fleet of islands," as Mark Twain once wrote, there is a tropical rain forest like no other in the world.

The Ola'a, as it's called, is an old Hawaiian name for the legendary sacred area where early Hawaiians went to collect bird feathers, although some say it also means "life" or "healing."

Few people know it exists, although it is at least 10,000 years old and full of incredible creatures who live in arboreal splendor near the red-hot heart of the erupting volcano island.

Picture the fictional Green Mansions; but this is a true Eden, free of stinging insects, poisonous vipers and fanged reptiles. Enter and you disappear into a Hawaii that exists in the imagination of all who yearn for Paradise.

In misty sunlight, honeycreeper birds suck nectar from red ohia blossoms, ferns grow big as trees and the gray-green ohia trees form a canopy that shelters all. It is easy to picture a dinosaur grazing in the cool shadows.

All is not perfect in the rain forest. Wild pigs root up ferns on the spongy forest floor, and alien plants such as banana poka choke out Hawaii's native species. Then there is man.

And what a grandiose plan he has. He will drill 200, maybe 300 wells or more, 8,000-feet deep into the hot magma in the field of greatest seismic activity on the eastern rift of Kilauea Volcano, the most active volcano on Earth, then extract hot steam and convert it to 500 megawatts of electricity.

The power will be transmitted overland and underwater through the longest, deepest cable ever laid in Hawaii — more than 150 miles in length at depths of 6,000 feet between the Big Island and Maui, to Oahu's Waimanalo Bay on the windward shore.

The goal is to free Hawaii's dependency on foreign oil and reduce consumer electric bills, which are among the nation's highest.

This geothermal project, estimated to cost in excess of $1.5 billion, is about to commence in the Wao Kele 'O Puna rain forest, on former state conservation land on the outskirts of gloomy Hilo, with the blessing of Hawaii's Governor John Waihee.

Geothermal, the governor says, is "the key to achieving our state goal of energy self-sufficiency."

Some of the world's largest developers, including Pacific Gas & Electric-Bechtel Generating Co. and Fluor Daniel Inc., of California, and Japan's C. Itoh & Co., have expressed interest in developing geothermal power here.

The first site is in a rain forest preserve above Pahoa, a small rural village of about 7,000 people who now have front row seats to watch what natural scientists say will be the destruction of the last tropical lowland rain forest in the United States.

No tour buses go to the rain forest. It isn't advertised or mentioned in guidebooks. If you can find the rain forest on the Big Island map, it appears in very small type.

So most people don't know there is a rain forest here. In fact, there are several, the two largest of which are the 9,654-acre Ola'a in Volcanoes National Park and the nearby 16,000-acre Wao Kele 'O Puna (*wao kele* means "green forest"), where the drilling is about to start.

Together, they form a 25,000-acre mosaic of rain forest that spills down from 3,970 feet over the eastern slope of Kilauea Volcano on the Big Island.

The Ola'a is bypassed daily by 1.8 million tourists who enter Volcanoes National Park in search of the high drama of a live volcano. The Wao Kele 'O Puna is off the tourist trail and seldom visited.

That is too bad, because it is a biological treasure: the last lowland stand of birds, plants and insects that live nowhere else in the world, like the rare yellow-headed, parrot-beaked 'O'u honeycreeper. Once common in Hawaii, it was last seen four years ago.

If there were jaguars or crocodiles here, Hawaii's rain forests probably would be world-famous attractions. Instead, its inhabitants are oddities, like the Happy Face spider, the world's only known "killer" caterpillar (it feeds on other insects) and the hoary bat.

Such creatures excite mainly scientists, who consider the islands "the best theater for evolution in the world" — greater even than Darwin's Galapagos Islands because of Hawaii's isolation in time, distance and environmental variation.

The biota of Hawaii is unique. Ninety-five percent of the state's flowering plants and 97 percent of its animals, including birds, live only in Hawaii, many only in the rain forests. In plant life, the rain forest "probably contains the richest assemblage of genera and species," wrote Harvard-educated botanist Sherwin Carlquist in "Hawaii: A Natural History."

The array of plant species, Carlquist wrote, also appears "more exclusively Indo-Malaysian, with relatively few American elements. It is more like forests in Queensland, New Guinea, the Philippines, Indonesia, Fiji and other Pacific Islands."

Though Hawaii's native rain forest appears luxuriant, it is vanishing.

Only 200 years ago, it covered nearly half of all the islands' surface. Now it covers less than 10 percent, according to aerial field surveys begun in 1976 by botanist James D. Jacobi, chief of the Hawaii Research Center.

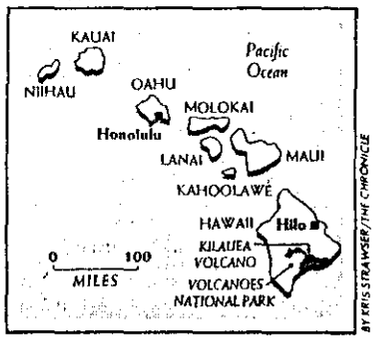
"The lowland forest has been hardest hit," Jacobi said, "but the Puna area remains undisturbed and still has dominant native plants."

Plantations, ranches and urban development all have claimed more than 60 percent. The first Polynesians and early Hawaiians did their part, and Kilauea's lava flows have claimed the rest.

"The rain forest is delicate, nonrenewable and collapsing fast," said Dan Clark, the

BY RICK CARROLL, SPECIAL TO THE CHRONICLE

Ralph Palikapu Dedman, president of the Pele Defense Fund, which opposes the geothermal project



BY KRIS STRAWSER/THE CHRONICLE

Former Chronicle reporter Rick Carroll covers the Pacific Rim as a Honolulu-based free-lance writer. He is a contributor to 'The Penguin Guide to Hawaii 1990,' to be published this month by Penguin Books of London and New York.

National Park Services resources management chief at Volcanoes National Park. Clark protects the Ola'a as a wilderness area, by congressional order.

Ideally, he said, the Ola'a should be surrounded by buffer zones to protect birds and insects, which know no political boundaries.

"The irony," Clark said, "is that while everyone is running around saving the rain forests of South America, our own is about to be destroyed. We should take care of our back yard first, before we set out worrying so much about destruction in South America.

"You can't sacrifice something irreplaceable like a rain forest ... to satisfy an insatiable hunger for air conditioning and neon lights. That's a sacrilege, and that's not why we're here."

Up to now, the big 500-megawatt geothermal project proposed by wildcat drillers from the Wyoming-based True/Mid-Pacific Corp. has attracted only local opposition from grassroots native Hawaiian organizers and downwind neighbors concerned about foul air, polluted water and toxic emissions.

A smaller 25-megawatt plant on a nearby 500-acre site is planned by the Israeli-owned Ormat Energy Systems. That project recently was approved the Hawaii County Planning Commission despite local opposition.

But while health risks are understandably paramount, few Big Island residents seem concerned about the rain forest's demise. "What rain forest?" people ask when you tell them where you are going. If a rain forest is bulldozed to lower electricity rates, then what's a few already endangered birds?

The process that begins with the felling of a few 100-foot ohia trees (a hardwood of the myrtle family) for an access road to a geothermal site in the Wao Kele 'O Puna rain forest may end in what biologists call a "catastrophe," forcing thousands to flee a cloud of hydrogen sulfide.

"One accident involving a long period of uncontrolled venting could cause an ecological disaster for birds and probably most other small plants and animals near the development," said Sheila Conant, a University of Hawaii ornithologist.

Catastrophe already has come, on a small scale, in Leilani Estates, a tidy subdivision across the street from the state's first geothermal plant, a 3-megawatt demonstration plant built in 1981 for Hawaiian Light & Power Co. to electrify a few thousand homes. It looks like a rusty old incinerator and smells like rotten eggs.

The day I visited the rain forest, a "malfunction" in the plant's muffler caused poisonous hydrogen sulfide gas to leak for 48 hours. The intense odor forced 10 people to flee their homes overnight. The gas was found to contain 27 parts per billion of hydrogen sulfide, or six times higher than the level acceptable to the Environmental Protection Agency. Officials described the gas leak as "not health threatening" but a "severe nuisance." Multiply that by 100 wells and Hawaii starts to smell very rotten, indeed.

Several days later, the state shut the demonstration plant down.

Maurice Richards is the development manager for Puna Geothermal Venture, an outfit not in the environmental crossfire and most likely to succeed. Richards is optimistic that sound geothermal development will reduce Hawaii's dependency on fossil fuels.

BY RICK CARROLL SPECIAL TO THE CHRONICLE

Emmett Aluli of the Pele Defense Fund

"Our competitors are in the more pristine conservation land, the rain forest area," said Richard. "We're down in agricultural land in the lower end of Puna, and in that district there are different environmental conditions."

The Puna Geothermal Venture is a 25-megawatt plant on 500 acres, designed to supply power for the Big Island only. Richard expects it to be in operation by the end of the year.

"Geothermal will be successful in Hawaii," Richard said, "because it's the most environmentally sound resource. It will, in the case of our 25-megawatt project, reduce the need for 20 million barrels of fossil fuel a year. In doing so, it will reduce the overall environmental air emissions by 50 percent during the night and 20 percent during the day by not burning fossil fuels."

Opponents of geothermal development in the rain forest fear that trouble will begin as soon as the bulldozer blade hits the ground.

"Succession after disturbance" is a phenomenon any home gardener knows too well. The raw earth is invaded by alien plants — "weedy" species like strawberry guava, Hilo grass and Koster's curse — which take root, forcing native plants out. A rain forest can become a weed patch almost overnight.

"Once an area is cleared of native species, [it] will never come back to its present state," said Dr. Peter M. Vitousek, a Stanford University professor of biological sciences. "Alien plants and the birds and insects they support will dominate any regrowing vegetation. Consequently, the area will lose much of its unique character and scientific and cultural value."

To scientists, the Hawaiian rain forest is a valuable natural laboratory. "Nowhere else on Earth," Vitousek said, "is there such a spectacular matrix of climate and soils occupied by plants and animals whose evolutionary history is so well known.

"Work in Hawaii, therefore, can allow us to determine what controls the way tropical forests grow and develop all over the world — something that we need more and more as the global consequences of tropical deforestation become apparent."

The irony is that while everyone is running around saving the rain forests of South America, our own is about to be destroyed. We should take care of our back yard first.

—DAN CLARK,
RESOURCES MANAGEMENT CHIEF
AT VOLCANOES NATIONAL PARK

Already D-9 bulldozers are carving access roads three miles above Pahoa School in the lowland Wao Kele 'O Puna rain forest so that exploratory well drilling may commence.

We visited the Wao Kele 'O Puna with Emmett Aluli, one of the leaders of the Pele Defense Fund, named for the Hawaiian goddess of fire, which is the chief opponent of geothermal development. We were prevented from entering the rain forest by a new steel gate guarded by an armed off-duty cop.

"Stop, go no farther," ordered the Hilo police sergeant at the gate to the rain forest. On his first day on the job, the officer seemed unsure of his new role as gatekeeper for the drilling crews, especially since he, like the two men seeking entry, is a native son of Hawaii.

"This is our land, Hawaiian land," said Emmett Aluli. "Your gate is illegal, pending a court decision in San Francisco."

It is to no avail. The new gate may be illegal, but to cross it, the officer warns, is criminal trespass. It is a classic "High Noon" standoff under a blazing sun, and San Francisco's judges are 2,390 air miles across the Pacific.

"It's wrong for you to take this job," Aluli told him. "Don't do it, *brah*. This is Pele's land, ceded Hawaiian land. We have a right to be here. This is a rain forest."

"I didn't know it was a rain forest," the policeman said. The informational breakthrough is a very small victory in the face of the raw gash of new road that indents the Wao Kele 'O Puna like a missing front tooth.

A small band of native Hawaiians, the Pele Defense Fund wages a daily David-style battle against the Goliath of geothermal development from a rented office in a failed Hilo tourist hotel.

The leaders, Aluli and Ralph Palikapu Dedman, have joined with the Rainforest Action Network of San Francisco to call for an unprecedented national boycott of Hawaii's tourism industry and such Big Island products as macadamia nuts, anthuriums and Kona coffee.

The boycott, a canny ploy to bring Hawaii's rain forest to center stage, is not likely to reduce Hawaii's 6.2 million annual visitor count, especially in winter, but Aluli and Dedman are steadfast.

"For us," Dedman said, "it is a sacrilege to keep poking holes in Pele's body to capture her steam and destroy her rain forests so people can make money."

To native Hawaiians, Pele, the goddess of fire, daughter of the Earth Mother and Sky Father, is an ever-present entity who both creates and destroys. Aluli reminds skeptics that when the Campbell Estate (one of Hawaii's most influential landowner families, the Campbells descended from early Christian missionaries) planned geothermal development on native land in 1983, Pele covered 10,000 acres with lava.

The Rainforest Action Network, Dedman and Aluli said, plans to install informational pickets at West Coast airports with direct flights to Hawaii. They said the campaign could escalate to civil disobedience at the rain forest gate with mass demonstrations and arrests.

"The Hilo jail only holds 52," Aluli said. "What if we had 100 people a day arrested for trespassing?"

A medical doctor who uses traditional Hawaiian herbs and potions for healing, Aluli, 45, is a survivor of other island battles. He is still trying to stop the U.S. Navy's bombing raids on Kahoolawe. Dedman, a Big Island fisherman, co-founded the Pele Defense Fund in 1983 and serves as the organization's president.

The group fought geothermal development in Hawaii's courts in 1986, charging a violation of their First Amendment constitutional right to practice native Hawaiian religion in the rain forest. The case was rejected as invalid by the Hawaii Supreme Court, and the U.S. Supreme Court declined to hear the case.

The Pele Defense Fund has also challenged the legality of a 1985 land swap in which the state gave the Campbell Estate 27,000-acres in and around the Wao Kele 'O Puna rain forest for geothermal projects. The suit, dismissed on technicalities in Hawaii's U.S. District Court, is on appeal before the U.S. Ninth Circuit Court in San Francisco.

"Geothermal is not safe, not clean and

See Page 23

BY SCOTT SOMMERDORF, THE CHRONICLE

Brazilian children play in the waters of the Amazon

HAWAII

Continued From Page 9

not economical," Randy Hayes, president of the Rainforest Action Network, said after returning from Hawaii in July. "It will not decrease Hawaii's dependency on oil because it will fuel further growth."

The nationwide boycott of Hawaiian products, he pledged, will be bigger than the Burger King boycott organized by RAN, which Hayes says forced the multinational hamburger chain to cancel $35 million worth of beef contracts with countries that convert rain forests to cattle pasture.

Nobody at the Hawaii Visitors Bureau wants, officially, to gauge the potential impact, if any, of a boycott on the $8 billion-a-year tourist industry. The state's top industry contributes to the $65 million state budget surplus and the lowest unemployment (1.5 percent) in the nation.

It is raining now in the Ola'a rain forest, as it does every day and night. Some years are wetter than others. This year has seen a record 300 inches of precipitation, so the forest is emerald green and glistening. In the half-light of the rain forest, a wing flash of shadows plays against ostrich-necked ferns. Honeycreepers, bright as jewels, crowd a flame red ohia blossom to sip nectar. Everything seems perfect, as it should be in Paradise.

Forty minutes away by Aloha Airlines jet, Waikiki's skyline burns kilowatts at hyperspeed, bright as a Saturday night carnival in Kansas. The only bird that thrives here is a man in a Woody Woodpecker costume hawking condo time-share flyers.

Real birds, such as pigeons, mynahs and English sparrows, are poisoned by hotels to keep lanais spotless so tourists don't complain.

Hawaii's native birds may be found in Oahu's Bishop Museum, stuffed and mounted, or with their bright green, yellow and scarlet feathered skins dried and pinned down in glass display cases like old ladies' hats. A specimen of the rare 'O'u honeycreeper is there, along with others who slipped off the endangered list into museum exhibits, victims of a changing island way of life. The Hawaiian crow may be next.

Someday, Hawaii may get cheap electricity to chill tourist hotel rooms by tapping Pele's volcano, but the 'O'u honeycreeper

MONEY TRAIL

Continued From Page 20

has kept apace, and Rich's organization is now urging European environmental groups to push their governments to use muscle at the World Bank.

Rising public awareness in the United States about the potential global effects of destroying tropical rain forests has nudged Congress into action. Six congressional subcommittees have held more than two dozen hearings on the rain forest since 1983, Rich said.

In late 1985, Congress passed legislation requiring the Treasury Department to use American muscle at the World Bank to push environmental concerns. Since then, each year's appropriations bill has directed the treasury secretary, who is the American voice at the World Bank, to express ecological concerns to the bank's directors. But, Williams said, "It is still being treated by the bank as a public relations problem."

Legislation now pending in both houses of Congress would require the treasury secretary to abstain from voting on a World Bank project unless environmental assessments are available 120 days before the vote on the loan. The legislation in the House, which has 32 co-sponsors, was introduced by Nancy Pelosi, D-San Francisco, in late June.

"The reason we're doing this," said Craig Middleton, Pelosi's press secretary, "is we want to urge them (the World Bank) to incorporate environmental concerns into project designs."

The bank's environmental assessments are not now public. American law can't require the World Bank to prepare environmental reports or to make them public. But the United States can refrain from voting, and, Williams said, Congress will not continue appropriating money if the United States does not vote at the World Bank.

In the future, friends of the rain forest hope the U.S. treasury secretary will demand complete environmental assessments of all projects that are supported by U.S. tax money. As a long-term goal, Hayes wants the World Bank to start quantifying environmental degradation in its preloan cost analyses. He argues that the transformation of rain forest into barren land is a one-time-only expenditure of a natural treasure, leaving the country resource-poor forever. It

The pressure on the World Bank has been partially successful. The World Bank reorganized its 6,000 employees in July 1987 and now has a central environmental division as well as environmental departments in each of its four geographical divisions.

In a Tokyo conference last month on "The Global Environment and Sustainable Development," World Bank president Barber Conable announced a bevy of new initiatives aimed at environmental concerns. The proposals included money for increased family planning and using natural gas to replace more polluting fuels.

The speech, billed as a major policy address, drew immediate criticism from environmentalists. The most outraged response was to a section in which Conable described some possible beneficial aspects of global warming. A spokesman for the Natural Resources Defense Council branded the idea "preposterous."

Hayes thinks the bank's new policies and reorganization are only cosmetic. "They've taken people out of other departments, like public relations, and put them in the environmental department," he said. "They've developed the language of environmentalism, but it's really a smoke screen for business as usual."

But as far as Rich is concerned, his idea has come a long way. "The World Bank delivered a public mea culpa. They admitted publicly that they've made mistakes."

In Indonesia, the bank has stopped financing new settlements for the transmigration project. Its funds now can be used only to bolster existing settlements.

And Polonoroeste money was held up for six months in 1985 because of Brazil's failure to meet the loan's conditions concerning the environment and the rights of indigenous people. It was the first time ever that the World Bank had withheld money for environmental reasons. And this summer, the World Bank convinced the Brazilian government to withdraw a request for a $500 million loan to build hundreds of dams, many of them in the Amazon rain forests.

"We need to continue to monitor and make sure that the banks deliver on their promises," Rich said. "There's been a lot of rhetoric." ■

AMAZON

Continued From Page 11

in fines.

The country has suspended many of the tax breaks that encouraged land clearing, banned export of timber, given a modest boost to scientific research in the Amazon and declared it will, in the words of Interior Minister João Alves Filho, "restrict activities predatory to the environment."

The effort seems to have made a dent in burning, which is down from last year, and last year was 40 percent under 1987.

But saving the Amazon must compete with other environmental problems that seem far worse to many Brazilians.

Many environmentalists in the country simply think the large, heavily polluted urban areas come first. Only after cleaning up their own back yards, they say, will Brazilians begin to support environmental projects in the faraway and, for now, largely intact Amazon.

work for an environmental agency, they ask me about the Amazon," said Julia Schreiner Alves, who works at the regional agency charged with cleaning up the smog, water pollution and toxic spills in the state of São Paulo in the nation's southeast. "I say, what Amazon? The Amazon is in very good condition compared to the rest of our country."

The São Paulo pollution control agency, called CETESB, is faced with staggering tasks. The city of São Paulo, with its 15 million residents, sits astride hundreds of miles of river, all dead, their fish wiped out by decades of untreated sewage and industrial effluent. The smog from 4 million cars and trucks, none with any air pollution equipment, is among the worst in the world.

In 1987, the city exceeded international health standards for carbon monoxide on 298 days. It is better this year, "but only because we had more rain," said Antonio Carlos Rossin, CETESB's director of program development. One CETESB official is proud to note birds are seen in Sa˜o Paulo, a sign of progress. A few years ago, there were none because the air was so bad.

The only reason it is not worse still is that about half the city's cars burn ethanol alcohol distilled from sugar cane. The alcohol burns to form aldehydes, which are potential carcinogens, but it compensates by producing less carbon monoxide and hydrocarbons.

Similar situations abound elsewhere. Rio de Janeiro's fabled beaches are often closed by pollution. A sugar mill planned for the mouth of the continent's largest lagoon, in the southernmost state of Rio Grande do Sol, threatens to wipe out its fishery. Sediment and pollution are killing most of the coral reefs on Brazil's northeast shore, and private companies gouge five tons of coral out each day to make cement. Mangrove forests are dying or being cut, and oil tankers spill oil almost with impunity offshore.

Brazil has already almost completely cut down one great woodland, the "Atlantic Forest" of tropical trees that 400 years ago covered 400,000 square miles along the shore. Less than 8,000 square miles remain, home for 21 species of monkey found nowhere else. Most of the forest is in Sa˜o Paulo state, surrounded by 80 million Brazilians.

Brazil's strongest grass-roots environmental movement, called the SOS Foundation for the Atlantic Forest, is a sort of Brazilian Greenpeace set up mainly to preserve this coastal forest remnant. It is gaining backing at the highest levels of Brazil's government.

The Amazon is big and perhaps Brazil has to start small. Perhaps the Amazon must wait. How long it can wait, though, is not certain.

Yet, things could turn out all right: If the Atlantic Forest and other critically endangered ecological systems are saved first. If Brazil's citizens, thus encouraged, demand a higher national ecological consciousness. If outside pressure from foreign governments and international lending agencies help slow big development projects that reward clearing the trees. If Brazil's beleaguered, outmanned environmental agents can successfully find and arrest those who burn the forest illegally. If the next Brazilian president decides after the November elections that the rain forest really must be saved. If world markets can be found for rain forest products. If the worst projections of destruction are not fulfilled — then the classical Amazon rain forest may well be

DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

JOHN WAIHEE
GOVERNOR
ROGER A. ULVELING
DIRECTOR
BARBARA KIM STANTON
DEPUTY DIRECTOR
LESLIE S. MATSUBARA
DEPUTY DIRECTOR

KAMAMALU BUILDING, 250 SOUTH KING ST., HONOLULU, HAWAII
MAILING ADDRESS: P.O. BOX 2359, HONOLULU, HAWAII 96804 TELEX: 7430250 HIDPED FAX: (808) 523-8637

MEMORANDUM

TO: The Honorable William Paty
The Honorable John Lewin
Mr. Bruce Anderson
✓Mr. Sus Ono
Mr. C. Freedman
Mr. David Matteson
William F. Quinn, Esq.
Mr. Doug Carlson
Mr. Leslie S. Matsubara
Mr. Maurice H. Kaya

FROM: Roger A. Ulveling

DATE: August 16, 1989

SUBJECT: Rain Forest Action Network

Enclosed please find a copy of the following for your information and records:

1. Relevant pages from The Endangered Species Act as amended by Public Law 97-304 (The Endangered Species Act Amendments of 1982)

which we received from our office in Washington D.C.

Donna Quon
Secretary to Roger A. Ulveling

Enclosures

98th Congress
1st Session

COMMITTEE PRINT

S. PRT.
98-9

THE ENDANGERED SPECIES ACT AS AMENDED BY PUBLIC LAW 97-304 (THE ENDANGERED SPECIES ACT AMENDMENTS OF 1982)

FEBRUARY 1983

Printed for the use of the Senate Committee on Environment and Public Works

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON: 1983

15-942 O

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ROBERT T. STAFFORD, Vermont, *Chairman*

HOWARD H. BAKER, Jr., Tennessee	JENNINGS RANDOLPH, West Virginia
JOHN H. CHAFEE, Rhode Island	LLOYD BENTSEN, Texas
ALAN K. SIMPSON, Wyoming	QUENTIN N. BURDICK, North Dakota
JAMES ABDNOR, South Dakota	GARY HART, Colorado
STEVE SYMMS, Idaho	DANIEL PATRICK MOYNIHAN, New York
PETE V. DOMENICI, New Mexico	GEORGE J. MITCHELL, Maine
DAVE DURENBERGER, Minnesota	MAX BAUCUS, Montana
GORDON J. HUMPHREY, New Hampshire	

BAILEY GUARD, *Staff Director*
JOHN W. YAGO, Jr., *Minority Staff Director*

TABLE OF CONTENTS

ERRATA

The next to the last line of section 8(b) (3) on page 30 should have the words "or plants" inserted after the word "wildlife."

NOTE

Amendments made by Public Law 97–304 are shown as follows: Language to be omitted is enclosed in bold brackets; new language is printed in italic; language in which there is no change is printed in roman.

ENDANGERED SPECIES ACT OF 1973*

FINDINGS, PURPOSES, AND POLICY

SEC. 2. (a) FINDINGS.—The Congress finds and declares that—

(1) various species of fish, wildlife, and plants in the United States have been rendered extinct as a consequence of economic growth and development untempered by adequate concern and conservation;

(2) other species of fish, wildlife, and plants have been so depleted in numbers that they are in danger of or threatened with extinction;

(3) these species of fish, wildlife, and plants are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people;

(4) the United States has pledged itself as a sovereign state in the international community to conserve to the extent practicable the various species of fish or wildlife and plants facing extinction, pursuant to—

(A) migratory bird treaties with Canada and Mexico;

(B) the Migratory and Endangered Bird Treaty with Japan;

(C) the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere;

(D) the International Convention for the Northwest Atlantic Fisheries;

(E) the International Convention for the High Seas Fisheries of the North Pacific Ocean;

(F) the Convention on International Trade in Endangered Species of Wild Fauna and Flora; and

(G) other international agreements.

(5) encouraging the States and other interested parties, through Federal financial assistance and a system of incentives, to develop and maintain conservation programs which meet national and international standards is a key to meeting the Nation's international commitments and to better safeguarding, for the benefit of all citizens, the Nation's heritage in fish, wildlife, and plants.

(b) PURPOSES.—The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the treaties and conventions set forth in subsection (a) of this section.

(c) POLICY.—(1) It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve

*As Amended by P.L. 94–325, June 30, 1976; P.L. 94–359, July 12, 1976; P.L. 95–212, December 19, 1977; P.L. 95–632, November 10, 1978; and P.L. 96–159, December 28, 1979.

tions set forth in or authorized pursuant to section 4(d) or section 9(a)(1) with respect to the taking of any resident endangered or threatened species.

(2) In furtherance of the purposes of this Act, the Secretary is authorized to enter into a cooperative agreement in accordance with this section with any State which establishes and maintains an adequate and active program for the conservation of endangered species and threatened species of plants. Within one hundred and twenty days after the Secretary receives a certified copy of such a proposed State program, he shall make a determination whether such program is in accordance with this Act. Unless he determines, pursuant to this paragraph, that the State program is not in accordance with this Act, he shall enter into a cooperative agreement with the State for the purpose of assisting in implementation of the State program. In order for a State program to be deemed an adequate and active program for the conservation of endangered species of plants and threatened species of plants, the Secretary must find, and annually thereafter reconfirm such finding, that under the State program—

(A) authority resides in the State agency to conserve resident species of plants determined by the State agency or the Secretary to be endangered or threatened;

(B) the State agency has established acceptable conservation programs, consistent with the purposes and policies of this Act, for all resident species of plants in the State which are deemed by the Secretary to be endangered or threatened, and has furnished a copy of such plan and program together with all pertinent details, information, and data requested to the Secretary;

(C) the State agency is authorized to conduct investigations to determine the status and requirements for survival of resident species of plants; and

(D) provision is made for public participation in designating resident species of plants as endangered or threatened; or that under the State program—

(i) the requirements set forth in subparagraphs (C) and (D) of this paragraph are complied with, and

(ii) plans are included under which immediate attention will be given to those resident species of plants which are determined by the Secretary or the State agency to be endangered or threatened and which the Secretary and the State agency agree are most urgently in need of conservation programs; except that a cooperative agreement entered into with a State whose program is deemed adequate and active pursuant to clause (i) and this clause shall not affect the applicability of prohibitions set forth in or authorized pursuant to section 4(d) or section 9(a)(1) with respect to the taking of any resident endangered or threatened species.

(d) ALLOCATION OF FUNDS.—(1) The Secretary is authorized to provide financial assistance to any State, through its respective State agency, which has entered into a cooperative agreement pursuant to subsection (c) of this section to assist in development of programs for the conservation of endangered and threatened species. The Secretary

shall make an allocation of appropriated funds to such States based on consideration of—

(A) the international commitments of the United States to protect endangered species or threatened species;

(B) the readiness of a State to proceed with a conservation program consistent with the objectives and purposes of this Act;

(C) the number of endangered species and threatened species within a State;

(D) the potential for restoring endangered species and threatened species within a State; and

(E) the relative urgency to initiate a program to restore and protect an endangered species or threatened species in terms of survival of the species.

So much of any appropriated funds allocated for obligation to any State for any fiscal year as remains unobligated at the close thereof is authorized to be made available to that State until the close of the succeeding fiscal year. Any amount allocated to any State which is unobligated at the end of the period during which it is available for expenditure is authorized to be made available for expenditure by the Secretary in conducting programs under this section.

(2) Such cooperative agreements shall provide for (A) the actions to be taken by the Secretary and the States; (B) the benefits that are expected to be derived in connection with the conservation of endangered or threatened species; (C) the estimated cost of these actions; and (D) the share of such costs to be borne by the Federal Government and by the States; except that—

(i) the Federal share of such program costs shall not exceed [66-2/3 per centum] *75 percent* of the estimated program cost stated in the agreement; and

(ii) the Federal share may be increased to [75 per centum] *90 percent* whenever two or more States having a common interest in one or more endangered or threatened species, the conservation of which may be enhanced by cooperation of such States, enter jointly into agreement with the Secretary.

The Secretary may, in his discretion, and under such rules and regulations as he may prescribe, advance funds to the State for financing the United States pro rata share agreed upon in the cooperative agreement. For the purposes of this section, the non-Federal share may, in the discretion of the Secretary, be in the form of money or real property, the value of which will be determined by the Secretary whose decision shall be final.

(e) REVIEW OF STATE PROGRAMS.—Any action taken by the Secretary under this section shall be subject to his periodic review at no greater than annual intervals.

(f) CONFLICTS BETWEEN FEDERAL AND STATE LAWS.—Any State law or regulation which applies with respect to the importation or exportation of, or interstate or foreign commerce in, endangered species or threatened species is void to the extent that it may effectively (1) permit what is prohibited by this Act of by any regulation which implements this Act, or (2) prohibit what is authorized pursuant to an exemption or permit provided for in this Act or in any regulation which implements this Act. This Act shall not otherwise be construed to void any State law or regulation which is intended to conserve

migratory, resident, or introduced fish or wildlife, or to permit or prohibit sale of such fish or wildlife. Any State law or regulation respecting the taking of an endangered species or threatened species may be more restrictive than the exemptions or permits provided for in this Act or in any regulation which implements this Act but not less restrictive than the prohibitions so defined.

(g) TRANSITION.—(1) For purposes of this subsection, the term "establishment period" means, with respect to any State, the period beginning on the date of enactment of this Act and ending on whichever of the following dates first occurs: (A) the date of the close of the 120-day period following the adjournment of the first regular session of the legislature of such State which commences after such date of enactment, or (B) the date of the close of the 15-month period following such date of enactment.

(2) The prohibitions set forth in or authorized pursuant to sections 4(d) and 9(a)(1)(B) of this Act shall not apply with respect to the taking of any resident endangered species or threatened species (other than species listed in Appendix I to the Convention or otherwise specifically covered by any other treaty or Federal law) within any State—

(A) which is then a party to a cooperative agreement with the Secretary pursuant to section 6(c) of this Act (except to the extent that the taking of any such species is contrary to the law of such State); or

(B) except for any time within the establishment period when—

(i) the Secretary applies such prohibition to such species at the request of the State, or

(ii) the Secretary applies succh prohibition after he finds, and publishes his finding, that an emergency exists posing a significant risk to the well-being of such species and that the prohibition must be applied to protect such species. The Secretary's finding and publication may be made without regard to the public hearing or comment provisions of section 553 of title 5, United States Code, or any other provision of this Act; but such prohibition shall expire 90 days after the date of its imposition unless the Secretary further extends such prohibition by publishing notice and a statement of justification of such extension.

(h) REGULATIONS.—The Secretary is authorized to promulgate such regulations as may be appropriate to carry out the provisions of this section relating to financial assistance to States.

[(i) APPROPRIATIONS.—For the purposes of this section, there are authorized to be appropriated not to exceed the following sums:

[(1) $10,000,000 through the period ending September 30, 1977.

[(2) $16,000,000 for the period beginning October 1, and ending September 30, 1981.]

INTERAGENCY COOPERATION

SEC. 7. (a) FEDERAL AGENCY ACTIONS AND CONSULTATIONS.—(1) The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All

other Federal agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act.

(2) Each Federal agency shall, inconsultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

(3) Subject to such guidelines as the Secretary may establish, a Federal agency shall consult with the Secretary on any prospective agency action at the request of, and in cooperation with, the prospective permit or license applicant if the applicant has reason to believe that an endangered species or a threatened species may be present in the area affected by his project and that implementation of such action will likely affect such species.

[(3)] *(4)* Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under section 4 or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. This paragraph does not require a limitation on the commitment of resources as described in subsection (d).

[(b) SECRETARY'S OPINION.—Consultation under subsection (a)(2) with respect to any agency action shall be concluded within 90 days after the date on which initiated or within such other period of time as is mutually agreeable to the Federal agency and the Secretary. Promptly after the conclusion of consultation, the Secretary shall provide to the Federal agency concerned a written statement setting forth the Secretary's opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat. The Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a)(2) and can be taken by the Federal agency or the permit or license applicant in implementing the agency action.]

(b) OPINION OF SECRETARY.—(1)(A) Consultation under subsection (a)(2) with respect to any agency action shall be concluded within the 90-day period beginning on the date on which initiated or, subject to subparagraph (B), within such other period of time as is mutually agreeable to the Secretary and the Federal agency;

(B) in the case of an agency action involving a permit or license applicant, the Secretary and the Federal agency may not mutually agree to conclude consultation within a period exceeding 90 days unless the Secretary, before the close of the 90th day referred to in subparagraph (A)—

(i) if the consultation period proposed to be agreed to will end before the 150th day after the date on which consultation was initiated, submits to the applicant a written statement setting forth—

(I) the reasons why a longer period is required;

(II) the information that is required to complete the consultation; and

(III) the estimated date on which consultation will be completed; or

(ii) if the consultation period proposed to be agreed to will end 150 or more days after the date on which consultation was initiated, obtains the consent of the applicant to such period. The Secretary and the Federal agency may mutually agree to extend a consultation period established under the preceding sentence if the Secretary, before the close of such period, obtains the consent of the applicant to the extension.

(2) Consultation under subsection (a)(3) shall be concluded within such period as is agreeable to the Secretary, the Federal agency, and the applicant concerned.

(3)(A) Promptly after conclusion of consultation under paragraph (2) or (3) of subsection (a), the Secretary shall provide to the Federal agency and the applicant, if any, a written statement setting forth the Secretary's opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat. If jeopardy or adverse modification is found, the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a)(2) and can be taken by the Federal agency or applicant in implementing the agency action.

(B) Consultation under subsection (a)(3), and an opinion issued by the Secretary incident to such consultation, regarding an agency action shall be treated respectively as a consultation under subsection (a)(2), and as an opinion issued after consultation under such subsection, regarding that action if the Secretary reviews the action before it is commenced by the Federal agency and finds, and notifies such agency, that no significant changes have been made with respect to the action and that no significant change has occurred regarding the information used during the initial consultation.

(4) If after consultation under subsection (a)(2), the Secretary concludes that—

(A) the agency action will not violate such subsection, or offers reasonable and prudent alternatives which the Secretary believes would not violate such subsection; and

(B) the taking of an endangered species or a threatened species incidental to the agency action will not violate such subsection;

the Secretary shall provide the Federal agency and the applicant concerned, if any, with a written statement that—

(i) specifies the impact of such incidental taking on the species,

(ii) specifies those reasonable and prudent measures that the Secretary considers necessary or appropriate to minimize such impact, and

(iii) sets forth the terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency or applicant (if any), or both, to implement the measures specified under clause (ii).

(c) BIOLOGICAL ASSESSMENT.—(1) To facilitate compliance with the requirements of subsection (a)(2) each Federal agency shall, with respect to any agency action of such agency for which no contract for construction has been entered into and for which no construction has begun on the date of enactment of the Endangered Species Act Amendments of 1978, request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action. If the Secretary advises, based on the best scientific and commercial data available, that such species may be present, such agency shall conduct a biological assessment for the purpose of identifying any endangered species or threatened species which is likely to be affected by such action. Such assessment shall be completed within 180 days after the date on which initiated (or within such other period as is mutually agreed to by the Secretary and such agency, *except that if a permit or license applicant is involved, the 180-day period may not be extended unless such agency provides the applicant, before the close of such period, with a written statement setting forth the estimated length of the proposed extension and the reasons therefor*) and, before any contract for construction is entered into and before construction is begun with respect to such action. Such assessment may be undertaken as part of a Federal agency's compliance with the requirements of section 102 of the National Environmental Policy Act of 1969 (42 U.S.C. 4332).

(2) Any person who may wish to apply for an exemption under subsection (g) of this section for that action may conduct a biological assessment to identify any endangered species or threatened species which is likely to be affected by such action. Any such biological assessment must, however, be conducted in cooperation with the Secretary and under the supervision of the appropriate Federal agency.

(d) LIMITATION ON COMMITMENT OF RESOURCES.—After initiation of consultation required under subsection (a)(2), the Federal agency and the permit or license applicant shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures which would not violate subsection (a)(2).

(e)(1) ESTABLISHMENT OF COMMITTEE.—There is established a committee to be known as the Endangered Species Committee (hereinafter in this section referred to as the "Committee").

(2) The Committee shall review any application submitted to it pursuant to this section and determine in accordance with subsection (h) of this section whether or not to grant an exemption from the requirements of subsection (a)(2) of this action for the action set forth in such application.

(3) The Committee shall be composed of seven members as follows:

(A) The Secretary of Agriculture.

(B) The Secretary of the Army.

(C) The Chairman of the Council of Economic Advisors.

(D) The Administrator of the Environmental Protection Agency.

(E) The Secretary of the Interior.

(F) The Administrator of the National Oceanic and Atmospheric Administration.

(G) The President, after consideration of any recommendations received pursuant to subsection (g)(2)(B) shall appoint one individual from each affected State, as determined by the Secretary, to be a member of the Committee for the consideration of the application for exemption for an agency action with respect to which such recommendations are made, not later than 30 days after an application is submitted pursuant to this section.

(4)(A) Members of the Committee shall receive no additional pay on account of their service on the Committee.

(B) While away from their homes or regular places of business in the performance of services for the Committee, members of the Committee shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed expenses under section 5703 of title 5 of the United States Code.

(5)(A) Five members of the Committee or their representatives shall constitute a quorum for the transaction of any function of the Committee, except that, in no case shall any representative be considered in determining the existence of a quorum for the transaction of any function of the Committee if that function involves a vote by the Committee on any matter before the Committee.

(B) The Secretary of the Interior shall be the Chairman of the Committee.

(C) The Committee shall meet at the call of the Chairman or five of its members.

(D) All meetings and records of the Committee shall be open to the public.

(6) Upon request of the Committee, the head of any Federal agency is authorized to detail, on a nonreimbursable basis, any of the personnel of such agency to the Committee to assist it in carrying out its duties under this section.

(7)(A) The Committee may for the purpose of carrying out its duties under this section hold such hearings, sit and act at such times and places, take such testimony, and receive such evidence, as the Committee deems advisable.

(B) When so authorized by the Committee, any member or agent of the Committee may take any action when the Committee is authorized to take by this paragraph.

(C) Subject to the Privacy Act, the Committee may secure directly from any Federal agency information necessary to enable it to carry out its duties under this section. Upon request of the Chairman of the Committee, the head of such Federal agency shall furnish such information to the Committee.

(D) The Committee may use the United States mails in the same manner and upon the same conditions as a Federal agency.

(E) The Administrator of General Services shall provide to the Committee on a reimbursable basis such administrative support services as the Committee may request.

(8) In carrying out its duties under this section, the Committee may promulgate and amend such rules, regulations, and procedures, and issue and amend such orders as it deems necessary.

(9) For the purpose of obtaining information necessary for the consideration of an application for an exemption under this section, the Committee may issue subpoenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents.

(10) [Except in the case of a member designated pursuant to paragraph (3)(G) of this subsection, no member shall designate any person to serve as his or her representative unless that person is, at the time of such designation, holding a Federal office the appointment to which is subject to the advice and consent of the United States Senate.] In no case shall any representative, including a representative of a member designated pursuant to paragraph (3)(G) of this subsection, be eligible to cast a vote on behalf of any member.

(f) REGULATIONS.—Not later than 90 days after the date of enactment of the Endangered Species Act Amendments of 1978, the Secretary shall promulgate regulations which set forth the form and manner in which applications for exemption shall be submitted to the Secretary and the information to be contained in such applications. Such regulations shall require that information submitted in an application by the head of any Federal agency with respect to any agency action include but not be limited to—

(1) a description of the consultation process carried out pursuant to subsection (a)(2) of this section between the head of the Federal agency and the Secretary; and

(2) a statement describing why such action cannot be altered or modified to conform with the requirements of subsection (a)(2) of this section.

(g) [APPLICATION FOR EXEMPTION AND CONSIDERATION BY REVIEW BOARD.] *APPLICATION FOR EXEMPTION AND REPORT TO THE COMMITTEE.*—(1) A Federal agency, the Governor of the State in which an agency action will occur, if any, or a permit or license applicant may apply to the Secretary for an exemption for an agency action of such agency if, after consultation under subsection (a)(2), the Secretary's opinion under subsection (b) indicates that the agency action would violate subsection (a)(2). [An application for an exemption shall be considered initially by a review board in the manner provided in this subsection, and shall be considered by the Endangered Species Committee for a final determination under subsection (h) after a report is made by the review board.] *An application for an exemption shall be considered initially by the Secretary in the manner provided for in this subsection, and shall be considered by the Committee for a final determination under subsection (h) after a report is made pursuant to paragraph (5).* The applicant for an exemption shall be referred to as the "exemption applicant" in this section.

(2)(A) [An exemption applicant shall submit a written application to the Secretary, in a form prescribed under subsection (f) of this section, not later than 90 days after the completion of the consultation process; or, in the case of any agency action involving a permit or license applicant, not later than 90 days after the date on which

the Federal agency concerned takes final agency action, for purposes of chapter 7 of title 5, United States Code, with respect to the issuance of the permit or license.] *An exemption applicant shall submit a written application to the Secretary, in a form prescribed under subsection (f), not later than 90 days after the completion of the consultation process; except that, in the case of any agency action involving a permit or license applicant, such application shall be submitted not later than 90 days after the date on which the Federal agency concerned takes final agency action with respect to the issuance of the permit or license. For purposes of the preceding sentence, the term "final agency action means (i) a disposition by an agency with respect to the issuance of a permit or license that is subject to administrative review, whether or not such disposition is subject to judicial review; or (ii) if administrative review is sought with respect to such disposition, the decision resulting after such review.* Such application shall set forth the reasons why the exemption applicant considers that the agency action meets the requirements for an exemption under this subsection.

(B) Upon receipt of an application for exemption for an agency action under paragraph (1), the Secretary shall promptly (*i*) notify the Governor of each affected State, if any, as determined by the Secretary, and request the Governors so notified to recommend individuals to be appointed [to the review board to be established under paragraph (3) and] to the Endangered Species Committee for consideration of such application*; and (ii) publish notice of receipt of the application in the Federal Register, including a summary of the information contained in the application and a description of the agency action with respect to which the application for exemption has been filed.*

[(3)(A) A review board shall be established for purpose of considering an application for exemption and submitting a report to the Endangered Species Committee under this subsection as follows:

[(i) One individual shall be appointed to the board by the Secretary not later than 15 days after an application is submitted pursuant to paragraph (2).

[(ii) One individual shall be appointed to the board by the President, not later than 30 days after an application is submitted pursuant to paragraph (2) and after consideration of any recommendations received pursuant to paragraph (2)(B). An individual appointed by the President under this subparagraph shall be a resident of a State, if any, in which the agency action will be, or is being, carried out.

[(iii) One administrative law judge shall be selected to serve on the board by the Civil Service Commission in the same manner as administrative law judges are selected under section 3344 of title 5 of the United States Code to be detailed to an agency which occasionally or temporarily is insufficiently staffed with administrative law judges. The use by the review board of such an administrative law judge shall be on a reimbursable basis.

[(B) If biological opinions of both the Secretary of the Interior and the Secretary of Commerce indicate that an agency action would violate subsection (a)(2), such Secretaries shall jointly convene a

review board to consider any application for exemption filed with respect to such agency action.

[(C) Members of a review board who are full-time officers or employees of the United States shall receive no additional pay on account of their service on the board. All other members shall be entitled to receive an amount not to exceed the daily equivalent of the annual rate of basic pay in effect for grade GS–18 of the General Schedule for each day during which they are engaged in the actual performance of duties vested in the board. While away from their homes or regular places of business in the performance of services for a review board, members of the board shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as persons employed intermittently in the Government service are allowed expenses under section 5703 of title 5 of the United States Code.

[(4) The Secretary shall submit the application to the review board immediately after its appointment under paragraph (3), and the Secretary shall submit to the review board, in writing, his views and recommendations with respect to the application within 60 days after receiving a copy of any application under paragraph (2).

[(5)(*3*) It shall be the duty of a review board appointed under paragraph (3) to make a full review of the consultation carried out under subsection (a)(2) and within 60 days after its appointment or within such longer time as is mutually agreed upon between the exemption applicant and the Secretary, to make a determination, by a majority vote, (A) whether an irresolvable conflict exists and (B) whether the Federal Agency concerned and such exemption applicant has—

[(i) carried out its consultation responsibilities as described in subsection (a) in good faith and made a reasonable and responsible affort to develop and fairly consider modifiations or reasonable and prudent alternatives to the proposed agency action which would not violate subsection (a)(2);

[(ii) conducted any biological assessment required of it by subsection (c); and

[(iii) refrained from making any irreversible or irretrievable commitment of resources prohibited by subsection (d).

[Any determination by the review board that an irresolvable conflict does not exist or that the Federal agency concerned or the exemption applicant has not met its respective requirements under subclause (i), (ii), (iii) shall be considered final agency action for purposes of chapter 7 of title 5 of the United States Code.]

(3) The Secretary shall within 20 days after the receipt of an application for exemption, or within such other period of time as is mutually agreeable to the exemption applicant and the Secretary—

(A) determine that the Federal agency concerned and the exemption applicant have—

(i) carried out the consultation responsibilities described in subsection (a) in good faith and made a reasonable and responsible effort to develop and fairly consider modifications or reasonable and prudent alternatives to the proposed agency action which would not violate subsection (a)(2);

(ii) conducted any biological assessment required by subsection (c); and

(iii) to the extent determinable within the time provided herein, refrained from making any irreversible or irretrievable commitment of resources prohibited by subsection (d); or

(B) deny the application for exemption because the Federal agency concerned or the exemption applicant have not met the requirements set forth in subparagraph (A)(i), (ii), and (iii). The denial of an application under subparagraph (B) shall be considered final agency action for purposes of chapter 7 of title 5, United States Code.

[(6)(4) If the review board determines that an irresolvable conflict exists and makes positive determinations under subclauses (i), (ii), and (iii) of paragraph (5), it shall proceed to prepare the report to be submitted under paragraph (7).]

(4) If the Secretary determines that the Federal agency concerned and the exemption applicant have met the requirements set forth in paragraph (3)(A) (i), (ii), and (iii) he shall, in consultation with the Members of the Committee, hold a hearing on the application for exemption in accordance with sections 554, 555, and 556 (other than subsection (b) (1) and (2) thereof) of title 5, United States Code, and prepare the report to be submitted pursuant to paragraph (5).

[(7) Within 180 days after making the determination under paragraph (6), the review board shall submit to the Committee a report discussing—] (5) *Within 140 days after making the determinations under paragraph (3) or within such other period of time as is mutually agreeable to the exemption applicant and the Secretary, the Secretary shall submit to the Committee a report discussing—*

(A) the availability of reasonable and prudent alternatives to the agency action, and the nature and extent of the benefits of the agency action and of alternative courses of action consistent with conserving the species or the critical habitat;

(B) a summary of the evidence concerning whether or not the agency action is in the public interest and is of national or regional significance;

(C) appropriate reasonable mitigation and enhancement measures which should be considered by the Committee [.]; *and*

(D) whether the Federal agency concerned and the exemption applicant refrained from making any irreversible or irretrievable commitment of resources prohibited by subsection (d).

[(8)](6) To the extent practicable within the time required for action under subsection (g) of this section, and except to the extent inconsistent with the requirements of this section, the consideration of any application for an exemption under this section and the conduct of any hearing under this subsection shall be in accordance with sections 554, 555, and 556 (other than subsection (b) (3) of section 556) of title 5, United States Code.

[(9) In carrying out its duties under this subsection, a review board may, and any member of a review board if so authorized by the review board, may—

[(A) sit and act at such times and places, take such testimony, and receive such evidence, as the review board deems advisable;

[(B) subject to the Privacy Act of 1974, request of any Federal agency or applicant information necessary to enable it to carry out such duties, and upon such request the head of such Federal agency shall furnish such information to the review board; and

[(C) use the United States mails in the same manner and upon the same conditions as a Federal agency.]

[(10)(7) Upon request of a review board, the head of any Federal agency is authorized to detail, on a nonreimbursable basis, any of the personnel of such agency to the review board to assist it in carrying out its duties under this section.]

(7) Upon request of the Secretary, the head of any Federal agency is authorized to detail, on a nonreimbursable basis, any of the personnel of such agency to the Secretary to assist him in carrying out his duties under this section.

[(11) The Administrator of the General Services Administration shall provide to a review board, on a reimbursable basis, such administrative support services as the review board may request.]

[(12)] *(8)* All meetings and records [of review boards] *resulting from activities pursuant to this subsection* shall be open to the public.

(h) EXEMPTION.—(1) The Committee shall make a final determination whether or not to grant an exemption within [90 days of receiving the report of the review board under subsection (g)(7).] *30 days after receiving the report of the Secretary pursuant to subsection (g)(5).* The Committee shall grant an exemption from the requirements of subsection (a)(2) for an agency action if, by a vote of not less than five of its members voting in person—

(A) it determines on the record, based on the report of the [review board] *Secretary, the record of the hearing held under subsection (g)(4)*, and on such other testimony or evidence as it may receive, that—

(i) there are no reasonable and prudent alternatives to the agency action;

(ii) the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat, and such action is in the public interest; [and]

(iii) the action is of regional or national significance; and

(iv) neither the Federal agency concerned nor the exemption applicant made any irreversible or irretrievable commitment of resources prohibited by subsection (d); and

(B) it establishes such reasonable mitigation and enhancement measures, including, but not limited to, live propagation, transplantation, and habitat acquisition and improvement, as are necessary and appropriate to minimize the adverse effects of the agency action upon the endangered species, threatened species, or critical habitat concerned.

Any final determination by Committee under this subsection shall be considered final agency action for puposes of chapter 7 of title 5 of the United States Code.

(2)(A) Except as provided in subparagraph (B), an exemption for an agency action granted under paragraph (1) shall constitute a permanent exemption with respect to all endangered or threatened species for the purposes of completing such agency action—

(i) regardless whether the species was identified in the biological assessment; and

(ii) only if a biological assessment has been conducted under subsection (c) with respect to such agency action.

(B) An exemption shall be permanent under subparagraph (A) unless—

(i) the Secretary finds, based on the best scientific and commercial data available, that such exemption would result in the extinction of a species that was not the subject of consultation under subsection (a)(2) or was not identified in any biological assessment conducted under subsection (c), and

(ii) the Committee determines within 60 days after the date of the Secretary's finding that the exemption should not be permanent.

If the Secretary makes a finding described in clause (i), the Committee shall meet with respect to the matter within 30 days after the date of the finding.

(i) REVIEW BY SECRETARY OF STATE.—Notwithstanding any other provision of this Act, the Committee shall be prohibited from considering for exemption any application made to it, if the Secretary of State, after a review of the proposed agency action and its potential implications, and after hearing, certifies, in writing, to the Committee within 60 days of any application made under this section that the granting of any such exemption and the carrying out of such action would be in violation of an international treaty obligation or other international obligation of the United States. The Secretary of State shall, at the time of such certification, publish a copy thereof in the Federal Register.

(j) Notwithstanding any other provision of this Act, the Committee shall grant an exemption for any agency action if the Secretary of Defense finds that such exemption is necessary for reasons of national security.

(k) SPECIAL PROVISIONS.—An exemption decision by the Committee under this section shall not be a major Federal action for purposes of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.): *Provided*, That an environmental impact statement which discusses the impacts upon endangered species or threatened species or their critical habitats shall have been previously prepared with respect to any agency action exempted by such order.

(l) COMMITTEE ORDERS.—(1) If the Committee determines under subsection (h) that an exemption should be granted with respect to any agency action, the Committee shall issue an order granting the exemption and specifying the mitigation and enhancement measures established pursuant to subsection (h) which shall be carried out and paid for by the exemption applicant in implementing the agency action. All necessary mitigation and enhancement measures shall be authorized prior to the implementing of the agency action and funded concurrently with all other project features.

(2) The applicant receiving such exemption shall include the costs of such mitigation and enhancement measures within the overall costs of continuing the proposed action. Notwithstanding the preceding sentence the costs of such measures shall not be treated as project costs for the purpose of computing benefit-cost or other ratios for the proposed action. Any applicant may request the Secretary to carry out such mitigation and enhancement measures. The costs incurred by the

Secretary in carrying out any such measures shall be paid by the applicant receiving the exemption. No later than one year after the granting of an exemption, the exemption applicant shall submit to the Council on Environmental Quality a report describing its compliance with the mitigation and enhancement measures prescribed by this section. Such report shall be submitted annually until all such mitigation and enhancement measures have been completed. Notice of the public availability of such reports shall be published in the Federal Register by the Council on Environmental Quality.

(m) NOTICE.—The 60-day notice requirement of section 11(g) of this Act shall not apply with respect to review of any final determination of the Committee under subsection (h) of this section granting an exemption from the requirements of subsection (a)(2) of this section.

(n) JUDICIAL REVIEW.—Any person, as defined by section 3(13) of this Act, may obtain judicial review, under chapter 7 of title 5 of the United States Code, of any decision of the Endangered Species Committee under subsection (h) in the United States Court of Appeals for (1) any circuit wherein the agency action concerned will be, or is being, carried out, or (2) in any case in which the agency action will be, or is being, carried out outside of any circuit, the District of Columbia, by filing in such court within 90 days after the date of issuance of the decision, a written petition for review. A copy of such petition shall be transmitted by the clerk of the court to the Committee and the Committee shall file in the court the record in the proceeding, as provided in section 2112, of title 28, United States Code. Attorneys designated by the Endangered Species Committee may appear for, and represent the Committee in any action for review under this subsection.

[(o) EXCEPTION ON TAKING.—Notwithstanding sections 4(d) and 9(a) of this Act or any regulations promulgated pursuant to such sections, any action for which an exemption is granted under subsection (h) of this section shall not be considered a taking of any endangered or threatened species with respect to any activity which is necessary to carry out such action.]

(o) Notwithstanding sections 4(d) and 9(a)(1) (B) and (C) or any regulation promulgated to implement either such section—

(1) any action for which an exemption is granted under subsection (h) shall not be considered to be a taking of any endangered species or threatened species with respect to any activity which is necessary to carry out such action; and

(2) any taking that is in compliance with the terms and conditions specified in a written statement provided under subsection (b)(4)(iii) shall not be considered to be a taking of the species concerned.

(p) EXEMPTIONS IN PRESIDENTIALLY DECLARED DISASTER AREAS.—In any area which has been declared by the President to be a major disaster area under the Disaster Relief Act of 1974, the President is authorized to make the determinations required by subsections (g) and (h) of this section for any project for the repair or replacement of a public facility substantially as it existed prior to the disaster under section 401 or 402 of the Disaster Relief Act of 1974, and which the President determines (1) is necessary to prevent the recurrence of such a natural disaster and to reduce the potential loss of human life, and (2) to involve an emergency situation which does not allow the

ordinary procedures of this section to be followed. Notwithstanding any other provision of this section, the Committee shall accept the determinations of the President under this subsection.

[(q) AUTHORIZATION.—There are authorized to be appropriated to the Secretary to assist review boards and the Committee in carrying out their functions under subsections (e), (f), (g), and (h) of this section not to exceed $600,000 for each of fiscal years 1979, 1980, 1981, and 1982. The Chairman of the Committee shall report to the Congress before the end of fiscal year 1979 with respect to the adequacy of the budget authority contained in this subsection.]

INTERNATIONAL COOPERATION

SEC. 8. (a) FINANCIAL ASSISTANCE.—As a demonstration of the commitment of the United States to the worldwide protection of endangered species and threatened species, the President may, subject to the provisions of section 1415 of the Supplemental Appropriation Act, 1953 (31 U.S.C. 724), use foreign currencies accruing to the United States Government under the Agricultural Trade Development and Assistance Act of 1954 or any other law to provide to any foreign country (with its consent) assistance in the development and management of programs in that country which the Secretary determines to be necessary or useful for the conservation of any endangered species or threatened species listed by the Secretary pursuant to section 4 of this Act. The President shall provide assistance (which includes, but is not limited to, the acquisition, by lease or otherwise, of lands, waters, or interests therein) to foreign countries under this section under such terms and conditions as he deems appropriate. Whenever foreign currencies are available for the provision of assistance under this section, such currencies shall be used in preference to funds appropriated under the authority of section 15 of this Act.

(b) ENCOURAGEMENT OF FOREIGN PROGRAMS.—In order to carry out further the provisions of this Act, the Secretary, through the Secretary of State, shall encourage—

(1) foreign countries to provide for the conservation of fish or wildlife and plants including endangered species and threatened species listed pursuant to section 4 of this Act;

(2) the entering into of bilateral or multilateral agreements with foreign countries to provide for such conservation; and

(3) foreign persons who directly or indirectly take fish or wildlife or plants in foreign countries or on the high seas for importation into the United States for commercial or other purposes to develop and carry out with such assistance as he may provide, conservation practices designed to enhance such fish or wildlife and their habitat.

(c) PERSONNEL.—After consultation with the Secretary of State, the Secretary may—

(1) assign or otherwise make available any officer or employee of his department for the purpose of cooperating with foreign countries and international organizations in developing personnel resources and programs which promote the conservation of fish or wildlife or plants, and

(2) conduct or provide financial assistance for the educational training of foreign personnel, in this country or abroad, in fish, wildlife, or plant management, research and law enforcement and to render professional assistance abroad in such matters.

(d) INVESTIGATIONS.—After consultation with the Secretary of State and the Secretary of the Treasury, as appropriate, the Secretary may conduct or cause to be conducted such law enforcement investigations and research abroad as he deems necessary to carry out the purposes of this Act.

CONVENTION IMPLEMENTATION

SEC. 8A. (a) MANAGEMENT AUTHORITY AND SCIENTIFIC AUTHORITY.—The Secretary of the Interior (hereinafter in this section referred to as the "Secretary") is designated as the Management Authority and the Scientific Authority for purposes of the Convention and the respective functions of each such Authority shall be carried out through the United States Fish and Wildlife Service.

(b) MANAGEMENT AUTHORITY FUNCTIONS.—The Secretary shall do all things necessary and appropriate to carry out the functions of the Management Authority under the Convention.

(c) SCIENTIFIC AUTHORITY FUNCTIONS.—(*1*) The Secretary shall do all things necessary and appropriate to carry out the functions of the Scientific Authority under the Convention.

(*2*) *The Secretary shall base the determinations and advice given by him under Article IV of the Convention with respect to wildlife upon the best available biological information derived from professionally accepted wildlife management practices; but is not required to make, or require any State to make, estimates of population size in making such determinations or giving such advice.*[1]

[(d) INTERNATIONAL CONVENTION ADVISORY COMMISSION.—(1) There is hereby established the International Convention Advisory Commission (hereinafter in this section referred to as the "Commission.")

[(2) The Commission shall be composed of the following members:

[(A) One member appointed by each of the following Federal officers from his respective agency:

[(i) The Secretary.

[(ii) The Secretary of Agriculture.

[(iii) The Secretary of Commerce.

[(iv) The Director of the National Science Foundation.

[(v) The Chairman of the Council on Environmental Quality.

[(B) One member appointed by the Secretary from among officers and employees of the State agencies having fish and wildlife conservation and management responsibilities.

[(C) The Secretary of the Smithsonian Institution is invited to appoint a member.

[(3)(A) Individuals who are appointed as members of the Commission under paragraph (2) must be scientifically qualified.

[(B) The term of office of a member of the Commission appointed under paragraph (2)(B) is two years and an individual may be ap-

[1] This amendment takes effect on January 1, 1981.

pointed under such paragraph for any number of terms; except that an individual may not be appointed under that paragraph for a term that would be a third consecutive term for that individual under that paragraph.

[(C) While away from his home or regular place of business in the performance of services for the Commission, a member appointed under paragraph (2)(B) or (C) shall be allowed travel expenses, including per diem in lieu of subsistence, in the same manner as the expenses authorized by section 5703(b) of title 5, United States Code, for persons in the Government service employed intermittently.

[(D) Members of the Commission who are full-time officers or employees of the United States shall receive no additional compensation on account of their service on the Commission.

[(4)(A) The Commission shall elect a chairman from among its members. The term of office of the chairman is one year.

[(B) No recommendation referred to in paragraph (5) shall be deemed to be a recommendation of the Commission unless a majority of the members of the Commission vote for that recommendation.

[(5) The Commission shall make recommendations to the Secretary or his designee on all matters pertaining to the responsibilities of the Scientific Authority under the terms of the Convention. The Commission shall include with any such recommendation any written dissenting view made by any member.

[(6) In the discharge of its responsibilities, the Commission shall, to the extent practicable, ascertain the views of, and utilize the expertise of the governmental and nongovernmental scientific communities, State agencies responsible for the conservation of wild fauna or flora, humane groups, zoological and botanical institutions, recreational and commercial interests, the conservation community and others as appropriate.

[(7) In any case in which the Scientific Authority decides not to accept a recommendation made by the Commission under paragraph (5), the Scientific Authority shall provide to the Commission a written explanation of the reasons for that decision and shall publish the explanation in the Federal Register.

[(8)(A) The Chairman of the Commission, with the concurrence of the Commission, shall appoint an Executive Secretary for the Commission. The Executive Secretary shall carry out such duties and functions as shall be prescribed by the Commission, shall be appointed subject to the provisions of title 5, United States Code, governing appointments in the competitive service, and shall be paid in accordance with the provisions of chapter 51 and subchapter III of chapter 53 of such title relating to classification and General Schedule pay rates.

[(B) The Secretary shall provide the necessary staff and administrative support for the Commission.]

(d) RESERVATIONS BY THE UNITED STATES UNDER CONVENTION.—If the United States votes against including any species in Appendix I or II of the Convention and does not enter a reservation pursuant to paragraph (3) of Article XV of the Convention with respect to that species, the Secretary of State, before the 90th day after the last day on which such a reservation could be entered, shall submit to the Committee on Merchant Marine and Fisheries of the House of Representatives, and to the Committee on the Environment and Public

Works of the Senate, a written report setting forth the reasons why such a reservation was not entered.

[(e) WILDLIFE PRESERVATION IN WESTERN HEMISPHERE.—The President shall designate those agencies of the Federal Government that shall act on behalf of, and represent, the United States in all regards as required by the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.]

(e) WILDLIFE PRESERVATION IN WESTERN HEMISPHERE.—(1) The Secretary of the Interior (hereinafter in this subsection referred to as the "Secretary"), in cooperation with the Secretary of State, shall act on behalf of, and represent, the United States in all regards as required by the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (56 Stat. 1354, T.S. 982, hereinafter in this subsection referred to as the "Western Convention"). In the discharge of these responsibilities, the Secretary and the Secretary of State shall consult with the Secretary of Agriculture, the Secretary of Commerce, and the heads of other agencies with respect to matters relating to or affecting their areas of responsibility.

(2) The Secretary and the Secretary of State shall, in cooperation with the contracting parties to the Western Convention and, to the extent feasible and appropriate, with the participation of State agencies, take such steps as are necessary to implement the Western Convention. Such steps shall include, but not be limited to—

(A) cooperation with contracting parties and international organizations for the purpose of developing personnel resources and programs that will facilitate implementation of the Western Convention;

(B) identification of those species of birds that migrate between the United States and other contracting parties, and the habitats upon which those species depend, and the implementation of cooperative measures to ensure that such species will not become endangered or threatened; and

(C) identification of measures that are necessary and appropriate to implement those provisions of the Western Convention which address the protection of wild plants.

(3) No later than September 30, 1985, the Secretary and the Secretary of State shall submit a report to Congress describing those steps taken in accordance with the requirements of this subsection and identifying the principal remaining actions yet necessary for comprehensive and effective implementation of the Western Convention.

(4) The provisions of this subsection shall not be construed as affecting the authority, jurisdiction, or responsibility of the several States to manage, control, or regulate resident fish or wildlife under State law or regulations.

PROHIBITED ACTS

SEC. 9. (a) GENERAL.—(1) Except as provided in sections 6(g)(2) and 10 of this Act, with respect to any endangered species of fish or wildlife listed pursuant to section 4 of this Act it is unlawful for any person subject to the jurisdiction of the United States to—

(A) import any such species into, or export any such species from the United States;

section 527 of that Act (19 U.S.C. 1527), relating to the importation of wildlife taken, killed, possessed, or exported to the United States in violation of the laws or regulations of a foreign country.

ENDANGERED PLANTS

SEC. 12. The Secretary of the Smithsonian Institution, in conjunction with other affected agencies, is authorized and directed to review (1) species of plants which are now or may become endangered, or threatened and (2) methods of adequately conserving such species, and to report to Congress, within one year after the date of the enactment of this Act, the results of such review including recommendations for new legislation or the amendment of existing legislation.

CONFORMING AMENDMENTS

SEC. 13. 1(a) Subsection 4(c) of the Act of October 15, 1966 (80 Stat. 928, 16 U.S.C. 668dd(c)), is further amended by revising the second sentence thereof to read as follows: "With the exception of endangered species and threatened species listed by the Secretary pursuant to section 4 of the Endangered Species Act of 1973 in States wherein a cooperative agreement does not exist pursuant to section 6(c) of that Act, nothing in this Act shall be construed to authorize the Secretary to control or regulate hunting or fishing of resident fish and wildlife on lands not within the system."

(b) Subsection 10(a) of the Migratory Bird Conservation Act (45 Stat. 1224, 16 U.S.C. 715i(a)) and subsection 401(a) of the Act of June 15, 1935 (49 Stat. 383, 16 U.S.C. 715s(a)) are each amended by striking out "threatened with extinction," and inserting in lieu thereof the following: "listed pursuant to section 4 of the Endangered Species Act of 1973 as endangered species or threatened species."

(c) Section 7(a)(1) of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601—9(a)(1)) is amended by striking out:

"THREATENED SPECIES.—For any national area which may be authorized for the preservation of species of fish or wildlife that are threatened with extinction." and inserting in lieu thereof the following:

"ENDANGERED SPECIES AND THREATENED SPECIES.—For lands, waters, or interests therein, the acquisition of which is authorized under section 5(a) of the Endangered Species Act of 1973, needed for the purpose of conserving endangered or threatened species of fish or wildlife or plants."

(d) The first sentence of section 2 of the Act of September 28, 1962, as amended (76 Stat. 653, 16 U.S.C. 460k–1), is amended to read as follows:

"The Secretary is authorized to acquire areas of land, or interests therein, which are suitable for—

"(1) incidental fish and wildlife-oriented recreational development;

"(2) the protection of natural resources;

"(3) the conservation of endangered species or threatened species listed by the Secretary pursuant to section 4 of the Endangered Species Act of 1973; or

"(4) carrying out two or more of the purposes set forth in paragraphs (1) through (3) of this section, and are adjacent to, or within, the said conservation areas, except that the acquisition of any land or interest therein pursuant to this section shall be accomplished only with such funds as may be appropriated therefor by the Congress or donated for such purposes, but such property shall not be acquired with funds obtained from the sale of Federal migratory bird hunting stamps."

(e) The Marine Mammal Protection Act of 1972 (16 U.S.C. 1361–1407) is amended—

(1) by striking out "Endangered Species Conservation Act of 1969" in section 3(1)(B) thereof and inserting in lieu thereof the following: "Endangered Species Act of 1973";

(2) by striking out "pursuant to the Endangered Species Conservation Act of 1969" in section 101(a)(3)(B) thereof and inserting in lieu thereof the following: "or threatened species pursuant to the Endangered Species Act of 1973";

(3) by striking out "endangered under the Endangered Species Conservation Act of 1969" in section 102(b)(3) thereof and inserting in lieu thereof the following: "an endangered species or threatened species pursuant to the Endangered Species Act of 1973"; and

(4) by striking out "of the Interior and revisions of the Endangered Species List, authorized by the Endangered Species Conservation Act of 1969," in section 202(a)(6) thereof and inserting in lieu thereof the following: "such revisions of the endangered species list and threatened species list published pursuant to section 4(c)(1) of the Endangered Species Act of 1973".

(f) Section 2(l) of the Federal Environmental Pesticide Control Act of 1972 (Public Law 92–516) is amended by striking out the words "by the Secretary of the Interior under Public Law 91–135" and inserting in lieu thereof the words "or threatened by the Secretary pursuant to the Endangered Species Act of 1973".

REPEALER

SEC. 14. The Endangered Species Conservation Act of 1969 (sections 1 through 3 of the Act of October 15, 1966, and sections 1 through 6 of the Act of December 5, 1969; 16 U.S.C. 668aa—668cc–6), is repealed.

AUTHORIZATION OF APPROPRIATIONS

[SEC. 15. Except as authorized in sections 6 and 7 of this Act, there are authorized to be appropriated—

[(1) not to exceed $23,000,000 for each fiscal years 1979 and 1980, not to exceed $25,000,000 for fiscal year 1981, and not to exceed $27,000,000 for fiscal year 1982 to enable the Department of the Interior to carry out such functions and responsibilities as it may have been given under this Act;

[(2) not to exceed $2,500,000 for each of fiscal years 1979 and 1980, not to exceed $3,000,000 for fiscal year 1981, and not to exceed $3,500,000 for fiscal year 1982 to enable the Department of Commerce to carry out such functions and responsibilities as it may have been given under this Act; and

[(3) not to exceed $1,500,000 for fiscal year 1980, not to exceed $1,750,000 for fiscal year 1981, and not to exceed $1,850,000 for fiscal year 1982 to enable the Department of Agriculture to carry out its functions and responsibilities with respect to the enforcement of this Act and the Convention which pertain to the importation or exportation of terrestrial plants.]

SEC. 15. (a) IN GENERAL.—Except as provided in subsections (b), (c), and (d), there are authorized to be appropriated—

(1) not to exceed $27,000,000 for each of fiscal years 1983, 1984, and 1985 to enable the Department of the Interior to carry out such functions and responsibilities as it may have been given under this Act;

(2) not to exceed $3,500,000 for each of fiscal years 1983, 1984, and 1985 to enable the Department of Commerce to carry out such functions and responsibilities as it may have been given under this Act; and

(3) not to exceed $1,850,000 for each fiscal years 1983, 1984, and 1985 to enable the Department of Agriculture to carry out its functions and responsibilities with respect to the enforcement of this Act and the Convention which pertain to the importation or exportation of plants.

(b) COOPERATION WITH STATES.—For the purposes of section 6, there are authorized to be appropriated not to exceed $6,000,000 for each of fiscal years 1983, 1984, and 1985.

(c) EXEMPTIONS FROM ACT.—There are authorized to be appropriated to the Secretary to assist him and the Endangered Species Committee in carrying out their functions under section 7 (e), (g), and (h) not to exceed $600,000 for each of fiscal years 1983, 1984, and 1985.

(d) CONVENTION IMPLEMENTATION.—There are authorized to be appropriated to the Department of the Interior for purposes of carrying out section 8A (e) not to exceed $150,000 for each of fiscal years 1983 and 1984, and not to exceed $300,000 for fiscal year 1985, and such sums shall remain available until expended.

EFFECTIVE DATE

SEC. 16. This Act shall take effect on the date of its enactment.

MARINE MAMMAL PROTECTION ACT OF 1972

SEC. 17. Except as otherwise provided in this Act, no provision of this Act shall take precedence over any more restrictive conflicting provision of the Marine Mammal Protection Act of 1972.

PROVISIONS OF PUBLIC LAW 97-304 WHICH DO NOT AMEND THE ENDANGERED SPECIES ACT

SEC. 2(a)

* * * * * * *

(b)(1) Any petition filed under section 4(c)(2) of the Endangered Species Act of 1973 (as in effect on the day before the date of the enactment of this Act) and any regulation proposed under section 4(f) of such Act of 1973 (as in effect on such day) that is pending on such date of enactment shall be treated as having been filed or proposed on such date of enactment under section 4(b) of such Act of 1973 (as amended by subsection (a)); and the procedural requirements specified in such section 4(b) (as so amended) regarding such petition or proposed regulation shall be deemed to be complied with to the extent that like requirements under such section 4 (as in effect before the date of the enactment of this Act) were complied with before such date of enactment.

(2) Any regulation proposed after, or pending on, the date of the enactment of this Act to designate critical habitat for a species that was determined before such date of enactment to be endangered or threatened shall be subject to the procedures set forth in section 4 of such Act of 1973 (as amended by subsection (a)) for regulations proposing revisions to critical habitat instead of those for regulations proposing the designation of critical habitat.

(3) Any list of endangered species or threatened species (as in effect under section 4(c) of such Act of 1973 on the day before the date of the enactment of this Act) shall remain in effect unless and until determinations regarding species and designations and revisions of critical habitats that require changes to such list are made in accordance with subsection (b)(5) of such Act of 1973 (as added by subsection (a)).

(4) Section 4(a)(3)(A) of such Act of 1973 (as added by subsection (a)) shall not apply with respect to any species which was listed as an endangered species or a threatened species before November 10, 1978.

○